

Royal School of Mines.

PROF. SMYTH'S LECTURES ON MINING—No. XLII.

[BY OUR SPECIAL REPORTER.]

Fifty years ago there was a great difference as regarded one point in different districts; the mineral was conveyed along the horizontal drifts in vessels which were not intended to pass up the shaft. In metal mines, for instance, where the barrow, or "dog," was employed, the material was capsized at the bottom of the shaft, into heaps or into plats, ready to be drawn up when convenient. This necessitated a second filling of the mineral into the kibble which passed only up and down the shaft, thus increasing the expense, and in the case of such minerals as tender coals breaking them up more. A very few years ago this method might be seen surviving in Somersetshire, in Belgium, and other districts. But the plan in the North of England was to load the coal into baskets, and then place the basket on a sled, to be pushed to the main or roley way, where the basket was placed on a frame set on broad wheels, called a rolley, or trolley, which was intended to carry three of the corves, or baskets. This constituted a great difference and advance on the old plan, but it has again been changed to a great extent within the last 40 years. Sometimes the wheels are made to turn on the axle, so that each can turn separately, but inasmuch as this, amongst other things, produces a great side friction of the flanges against the rails it has generally been sought to fix the wheels to the axle, and make the axle turn in bearings; or, again, where they have to run through irregular places both wheels and axles may be loose. At the present time it has become almost universal in the larger works of northern and central England to endeavour to get the rails as near to the face of work as possible, and then to carry the coal in the same wagons, without any shifting, to the shaft, draw them up to the surface, and then run them to the screens, or wherever the material is needed. The most convenient form of wagon is very much that which was proposed by Mr. Curr, which was adopted in Somersetshire in 1835, but it was a number of years after that before its use became general. From about the year 1840, from the great improvement due to the use of cages sliding on regular guides in the shaft, and carrying from one to six of these wagons, they have become universally adopted. It may be that the tubs cannot be brought close to the actual face of work, they will then be brought as near as possible, and the material carried to them. Very commonly, instead of strong boys being employed in pulling the wagons to the main roads, small ponies are used in the northern collieries driven by younger boys. On reaching the main roads horses are employed to drag a set of wagons to the shaft; in some of the larger mines from 80 to 200 horses are employed, so that the whole question as to the horses and wagons becomes a very serious one. Where the roads are properly constructed the horse may draw 12 to 14 of these small tubs; in the iron mines the number may be less, but each may weigh more. In some of the iron mines, where a large quantity is taken out daily, and where there is head room sufficient, they find it advantageous to employ the best and finest horses they can get. The question of the road must also be brought in in considering the amount which can be done by the horses; both the preliminary roads and also the main roads, the latter being sometimes miles in length.

Another plan of conveying the coal to considerable distances may be used where the coal is worked to the rise—the "jig-brow." At the upper end of the road is a wheel, round which a rope passes, the full tubs running down one side draw up the empty tubs, the speed being regulated by a simple brake. This principle, in a rudimentary form, may be sometimes seen, where a little face of long wall is carried up at sufficient inclination; a boy goes down with the full sledge, which on slippery clay may have no rolls at all, the boy regulating the speed with his feet. Sometimes a counterpoise is used instead of the empty wagons, and occasionally the employment of a horse is assisted up a hill by means of what the colliers call a "billy"—a horizontal wheel, round which a rope goes, fixed at one end to full wagons, the others being fastened to the empty wagons, which have a tendency to descend. In certain cases the cost of conveyance is a not inconsiderable fraction of the total value of the mineral, so that the question is one which deserves very careful consideration in all its bearings in order to determine what is the most satisfactory system.

Much valuable information is to be found in the papers of Mr. Nicholas Wood in the Transactions of the Northern Institute. His experiments were very interesting, showing that at the outside, with every advantage, a horse on a level road, pulling an ordinary tram with edge rails, would at the maximum draw 133 tons 1 mile in a day, or we may say that a common performance of an ordinary horse on a road kept in good repair would be 100 tons for 1 mile per day. In mining work, unless there is very accurate discipline, there is apt to be considerable delays in passing, to say nothing of the carriages getting off the rails, &c. When Mr. Wood examined what was being done in the collieries, he found it very much less than the maximum; with wheels of 12 in. diameter only 30 to 50 tons per day were drawn by each horse, while with 10 in. to 11 in. wheels, and with very considerable delay, only 11 to 15 tons per day were drawn. The use of larger wheels with the tubs preferred in the central and northern districts is very difficult; in South Wales they prefer much larger tubs, of sheet-iron, which may contain as much as 1 ton, and with larger wheels instead of the tub weighing 3 to 4 cwt., and conveying only 8 or 9 cwt., as used in the former districts. The disadvantages of these larger tubs are that they cannot always go up the shaft, and if they get off the rails it requires several men to get them right again, and this may occasion much delay, whereas one man could probably put right a smaller tub. In Germany and France the subject of tubs has been carefully studied, and one may see a great variety there; in some cases, in order to get a higher wheel, they have greatly modified the form, but it is doubtful whether such has any advantage as to economy over the simpler English tubs. Iron and steel tubs have been used during the last few years, and while some praise them very much for their strength and durability, the objection to them is that if an accident occurs, and they get twisted out of shape, it is a difficult matter to repair them, while with a wooden one the taking out of a plank or two is a matter easily done by the mine carpenter.

One of the greatest improvements in mining has taken place in the last quarter of a century, though it is quite true that certain varieties of machinery were brought into play comparatively early in this century. It is quite evident that the fruitful mind of George Stephenson was at work on these things, for in the classic mine of Killingworth he introduced apparatus for bringing the coal to the pit bottom when the coal to the rise had been exhausted. In most of these early cases the engines were erected at the surface, and a rope or chain passed down to the bottom, and was taken down the inclined plane by a pulley. Both by calculation and experiment Mr. N. Wood showed that an inclination of 1 in 30 was the most suitable for the main roadways. If you have an angle of 1 in 30, you may make the full wagons run down of themselves, and draw up the empty ones, if the road is in tolerably good order; below the angle you require horses or machinery. If you have a dip of 1 in 23 below the level you may let the empty wagons run down by themselves, and they will drag out the rope for the drum, but must draw them up by the engine. The improvement specially referred to was that of the employment of underground engines, placed somewhere near the pit bottom, for the purpose of drawing the mineral along the roads. Usually a small double-acting cylinder engine is placed in a special chamber, and worked either by steam brought down the shaft or from boilers adjoining, the steam and smoke being delivered into the upcast.

In the main and tail rope system drums or rope rolls are used; a main rope is attached to the full tubs, which are hauled in by the engine winding the rope on a drum; at the same time a lighter rope is attached to the hinder end, and is being drawn out; this will serve afterwards to draw back the train of empty tubs to the far end of the working. The ropes have to be protected and carried

by pulleys, which prevent their rubbing on any point. The economy to be gained is so obvious that where there is a considerable output a plan more or less of this kind must be carried out. The second system is that which has been practised in some parts of Lancashire with success. Instead of having a train of wagons and a rope, there is substituted for the rope a chain travelling at a low rate of velocity, and the tubs are brought in from the place of working, and the chain is thrown over a fork on the top of each tub, and carries it on, the chain hanging in a series of catenary curves between the several tubs which are travelling. The distance between the wagons vary from 10 to 30 yards; an empty wagon may be put in here and there, to keep the chain off the ground. In this manner the whole series of wagons will be brought in to the hanger-on, who will just unhitch the wagon by throwing off the chain. The third plan is that of having an endless wire rope, the wagons being clipped on to this rope; or in another modification the endless rope rests on the wagons, just as in the case of the chain in the second plan. This reminds one of the plan of conveyance at the surface by a wire-rope, about which so much has been said in late years, and which in certain parts of the country, and where small quantities only have to be conveyed, seems very satisfactory. The rate given to the wagons is, of course, very moderate in the two latter systems, not more than 3 or 4 miles an hour; where the main and tail rope method is used a considerable velocity is got up; a train of 20 to 50 wagons will be carried along at the rate of 10 to 15 miles per hour, the speed being easily checked as they approach the shaft by throwing them on to an inclined plane. The systems of endless chain or rope are very suitable for one line of communication, but scarcely suitable where you have branched communication to follow out. With the tail rope system this branched communication is easy; there will be a pulley at the end of the branch, and the two ends of the rope in the branch can easily be attached to the two ends of the principal rope unhitched. In some of the larger collieries this underground work has been admirably carried out with engines working by compressed air, the compressing machines being situated at the surface. The engines have enabled the horse labour to be done away with, unless it be the use of small ponies in the subordinate roadways, and as the expense of this engine plant varies between 1d. and 2d. per ton per mile, the gain is enormous. The question has even been asked whether locomotives could not be employed, and in some American mines, in the partially covered-in surface levels, special locomotives have been used; the engines being only 12 ft. by 4 ft. 4 in., with gauge of 3 ft. 6 in., and the engine weighing only 1100 lbs., with fuel and water included. It is very doubtful at the present time where locomotives could be employed in many cases for underground traction, it having to be remembered that the quantity of carbonic acid generated by the fire of a locomotive is very great, and this, together with the smoke and steam, would be quite incompatible with any ordinary ventilation.

There is still one other method of underground conveyance to be mentioned—water conveyance. About 100 years ago this was very differently thought of from what it is now; it was thought great advantages might be obtained in some cases by cutting the levels somewhat deeper than usual, and using them as canals. A very remarkable instance may still be seen in the Bridgewater mines, in Lancashire, where at one time upwards of 40 miles of navigable underground canal was open. These canals were 10 ft. wide, the boats were small and flat bottomed, and each contained about 10 tons, while certain larger boats were used, which could be drawn out into the open canal adjoining. There is no comparison of this system, however, with railways, and the improvements in the latter have led to their ousting this method of water conveyance.

MINERS' ASSOCIATION OF CORNWALL AND DEVON.

The report of this association for 1875 has just been issued, and shows that although the institution still requires more pecuniary support than it obtains, it is doing useful work, and making satisfactory progress. It is explained that while the general depression and the low price of tin have deprived the association of some subscriptions, the teaching work has been more than ordinarily successful—more classes have been in operation, more prizes gained at the Science and Art Examinations than ever before, and higher successes have been obtained in the important subject of mining. It is mentioned that the want of a good laboratory at Redruth or Camborne is much felt; the most advanced members of the classes want some place in which they can conduct experiments in assaying and chemical analysis. The desirability of a laboratory in connection with technical classes is so evident that it may be hoped some of the more energetic of the students will form themselves into a committee, and set about raising a separate fund for providing the accommodation desired, and if it were found that they endeavoured to assist themselves by continued contributions, however small, each class night, the necessary extraneous aid would soon be forthcoming.

The papers read at the last annual meeting, which, as will be remembered from the notices of them published in the *Mining Journal* at the time, were of a highly interesting character, are printed with the report, and should be carefully perused by mining students generally. The account of phosphorite mining in Nassau, contributed by Mr. Joseph Garland, contains an excellent history of the discovery, and explains the cause of phosphorite mining having become unremunerative. In 1864 the phosphorite was accidentally discovered while searching for manganese at Staffell, near Limburg, on the Lahn. Large beds were found, and analyses by Mohr and Fresenius gave the percentage of phosphate of lime as 67.8 and 68.89 per cent. respectively. Further discoveries were subsequently made, and both English and German companies were formed to work them. The demand for the newly-discovered phosphorite by the manufacturers of superphosphate of lime in North and South Germany was great, and no inconsiderable quantities were shipped to England, large contracts being made between the producers of the mineral and English superphosphate houses, for the supply of—in some cases—several thousands of tons per annum. The trade with England, however, soon fell off, and some heavy losses to the over-sea producers were the result. The cause of this was twofold: first, it was soon discovered that although the deposits were practically inexhaustible—at least, for a considerable period, the quantity of high percentage phosphorite bore a comparatively small proportion to the whole bulk raised, and it was only the high quality stuff which would bear the freight to England; and secondly, experience showed that the Lahn phosphorite contained a considerable percentage of iron, which to the manufacturer of superphosphate of lime is highly objectionable.

The thickness of the beds or masses is very various, and ranges perhaps from 6 inches up to as many feet; in exceptional cases pockets of 10 to 15 feet are met with. In one case Mr. Garland has known a bed of 5 to 12 feet in thickness, extending uninterruptedly over more than 30 fathoms in length; the bed had in this instance an underlie of 60° to 65°, and more resembled a lode than in any other instance he had known. That it was a bed, and not a lode, was, however, shown by the fact that it was interstratified with the shale which forms its hanging and foot walls. The more frequently occurring beds have an average thickness of 2 or 3 feet. As to the depth from surface at which the phosphorite deposits occur, this depends upon the depth of the limestone. This rock when the phosphorite occurs at surface, it often lies, it generally is struck by sinking a few fathoms through the overlying clay, the most usual depth being some 8 to 10 fathoms. Sometimes, however, it is not reached till a depth of 20 fathoms or more is attained, and beds of phosphorite are occasionally worked at a profit at such depths, but they must be exceptionally good in such cases to make it worth while to follow them. On the other hand, the limestone is sometimes met with only a few feet from surface, and phosphorite is occasionally found under those circumstances just beneath the soil, by the removal of which the mineral is easily won by open workings.

It is explained that in the process of mining the phosphorite two shafts, about 10 fathoms apart, are sunk simultaneously to the limestone, and communication effected as quickly as possible by cross-cut for ventilation. The shafts are round, and 3½ to 4 ft. in diameter, the stuff being drawn to surface by a common tackle or windlass, and accumulated round the mouth of the shaft about 5 ft. high. The collar of the shaft being in "made ground" is timbered with square sets of roughly hewn fir, 5 or 6 in. in diameter, the price of the fir trees being 6d. to 8½d. per cubic foot. The ground being only a stiff clay, shafts are rapidly sunk, the price for sinking averaging 3s. to 6s. per metre for ordinary depths of 7 and 8 fms. The clay has often sufficient tenacity to stand without timbering for shallow depths during the summer months, but it is necessary to adopt a kind of timbering when the shafts exceed 5 or 6 fms. in depth, and have to stand over the wet season. The method adopted to secure the shafts is peculiar. The shaft is lined up with withies, wound round in a spiral form, their tension being sufficient, generally, to resist the pressure of the clay. These withies are the young branches of the beech, and are chosen 15 to 20 ft. in length, and about 1½ in. thick at one end, tapering away to about ¾ in. at the other; they are delivered on the mine at 1d. to 1½d. each. When fresh they are supple, and easily placed around the shaft; about 30 or 40 of them are required to a fathom. A shallow shaft, well lined up in this way, often stands two years, a period generally long enough to exhaust the ground in its proximity or its phosphorite. Deep shafts, however, by which is here meant shafts of 15 to 20 fms. in depth—become crooked and contorted as rapidly as to require cutting down and re-lining every three or four months. When the ground is wet, which is not often the case, the withies are bound round with straw before they are placed in the shaft.

Two shafts having been sunk, and ventilation secured, the ground is now explored and opened up by levels in various directions for stopping. In general phosphorite is found in the shaft before the limestone is reached; the plan pursued is, therefore, to follow the bed or the pockets of mineral wherever they may lead without any attempt to carry out any definite system of working, the rules

which guide the miner being to follow the various ramifications of the deposits, to keep close down on the limestone so as to make sure of no bed escaping him, and to stop away the deepest beds and those farthest from the shaft head. Blasting is seldom resorted to in phosphorite mining, and it is only in summer raised on contract or bargain work, a sort of tribute system being almost invariably the bulk of the phosphorite as broken down in the mine is intimately mixed with clay, and is washed either by hand or machinery to make it fit for market. The explanation of the Diamond rock borer given by Major Beaumont, M.P., and the discussion which followed it, left no doubt that for the purposes to which it is invaluable, but will do the work at one-twentieth the price of hand labour, its existence or otherwise of a lode supposed to pass through a property at 50 fathoms from surface can be proved with the Diamond drill for 2000., and in only one-fourth the time required by hand labour. Major Beaumont stated that the drill would not do work cheaper than hand labour where percussive drills can be used, but that of tin at Park of Mines, by Dr. C. Le Neve Foster, and on the rawton iron mines, by Mr. Collins, cannot be fully referred to without reference to the diagrams accompanying them; these diagrams are very clearly printed in the *Mining Journal*, papers on mechanical appliances for draining mines, by Mr. S. Holman; on the drainage of mining districts, by Mr. C. Butlin; on the elvan courses of Cornwall, by Mr. W. H. Argall; and on a cross section from Cook's Kitchen to the Cornwall, Henricetta are all worthy of careful study, and the last in the book, by Mr. F. Clark, is especially so; it is a note on the sections of lead districts in Cornwall, showing the productive and unproductive rocks.

The first of the sections given by Mr. Clark extends from the northern end of Perran Bay, through Gravel Hill Iron Mine, Wheal Budnick, West Chiverton, South Chiverton, and so on to Truro. The second is from Newquay, West Chiverton, East Wheal Rose, South Cargill, Killfret, and on to Tresillian. The third is an east and west direction from Trewavas Head, through Wheal Rose to the local bar. Longitudinal and transverse sections of West Chiverton Mine are also given on a considerably enlarged scale. In the three first sections the scale is too small to allow of the lodes themselves being shown, but they explain that besides of two kinds; the productive rock is of a light greyish-yellow sandstone, the kilias is rather soft, and changing to a greyish-blue colour at a few fathoms depth. The unproductive rock is of a dark blue colour, and very hard, often peeling into layers, South Cargill, West Chiverton, and Wheal Rose are all in the productive strata, sometimes between sometimes below the unproductive blue rock; while, on the contrary, many of the mines which have proved unremunerative, such as Kead, Wentworth, Chiverton Valley, Great South Chiverton, and Wheal Elizabeth, come down on the dark unproductive rock already referred to. The influence of these different kinds of rocks upon the lode is well shown in the longitudinal section of West Chiverton, where the ore ground is entirely in the productive rock, while the dark-coloured sandstone rock is barren, although tested at many points by levels and shafts.

THE PROSPECTS OF CORNISH HEMATITES.

Pestilence weakens our physical constitution, but when the plague is over we enjoy the greater freshness and purity of the atmosphere we breathe. We have seen the raging pestilence which has just swept over our great industries, and left weakness, devastation, or ruin in its train. We have seen our working communities falling by thousands into the popular errors and fallacies of the age. We have tried to stay the fever of agitation, which only leaves poverty and prostration, but we have been disregarded. It seems a plague was necessary to teach the heedful lesson, and now the plague has done its work, the pestilence is being spent, the over-reaching workman on the one hand and the over-reaching speculator on the other have been arrested, and already, though reduced to much weakness, we begin to feel a fresher, purer, and more healthy atmosphere in the midst of all our industries.

Time alone shall give strength and vigour, but we observe many who desire to be strong already in the field and at work. For the last few weeks the heights and moors of Cornwall have been visited by sundry engineers, whose movements are exceedingly quiet, but from their enquiries they are in search of superior hematites containing magnesia.

All careful observers of our industries have anticipated such an enquiry, for at no period in the history of iron manufacture has so much attention been paid to this class of iron ores, either for mixing with inferior ores, or for the manufacture of superior brands of iron, or for the production of steel. In this material Cornwall is rich. Her tin is at a discount, but her hematites are as yet undeveloped. Her great centre of manganese ores runs north and south of St. Columb Major, or from Portgwin to Perran Bay.

We hail this streak of sunshine from beneath the long black cloud, and it behoves Cornwall to take advantage of the golden opportunity thus presented, and press forward with the flowing tide, invigorated with the echoes of this great truth—"There is a tide in the affairs of man which taken in its flow leads on to fortune."

It will be worth our while at this opportune moment to consider a few points on which the prosperity or non-prosperity of the future will depend, so far as Cornish iron mines are concerned. It is well known that some existing, or lately existing, mines have been unsatisfactory, and that for very patent reasons, while others have more than satisfied the highest hopes of all concerned. Success or non success depends on certain conditions, of which we may note the following:—

1.—On the amount of purchase-money. It may be assumed as an axiom that if speculators, vendors, or adventurers pocket 20,000, or 50,000, apiece out of an adventure, the shareholders have little reason to look for profits or dividends. We are well aware that much time and a little money is required to negotiate sets, sink trial pits, send engineers to survey, and get assays to analyse. We are well aware that many a spot is looked at before a suitable one is chosen for the market, and we are well aware that vendors have often to keep their sets for years till a proper opportunity occurs for placing them on the market, for all which we are ready to make allowance, and for all of which we think they ought to be paid; but we think vendors would best consult their own interests and best obtain the confidence of the public if they placed their demands within the bounds of reason, for the public are very properly indisposed to pay the exorbitant prices which of late years have become fatal to many an otherwise good undertaking.

2.—Success also depends on position or situation. There are mines so placed that they can neither have railway sidings nor water carriage, and where they also have, in addition, to pump and wind everything to the surface. Where all these, or most of them, are essential to the working of a hematite mine, we should say to investors avoid such a property, for Cornwall has hematites in better situations, where the natural formation of the country favours excavations and adits, and where railway or water carriage can be secured. The less expense that is required in opening up a property the better.

3.—The quantity and quality of the ore are also material elements of success. On these points reliance can only be placed on the engineer on the one hand, and the assayer on the other, as, perhaps, the most competent guides the public can obtain; yet it may be well to note that Cornish iron ores present more the formation of a string of beads than a uniform strata, and that there are points where the quality is not so uniform as at others, and that it is essential to have the ore well sorted or selected for the market. We are sorry that so little attention has been paid to this in the past, and hope the managers would take our advice in this respect, for we are certain it would contribute to their own advantage. We know several illustrations of the kind, and may refer to thousands of tons of ore now lying at Par Station, in Cornwall, which has never been sorted, and which in its present state should never have left the pit. We also know the same lode worked by different parties with very different results, the one yielding several shillings per ton more than the other, mainly through proper selection.

4.—Another element of success rests on economy. We do not mean that the fewer appliances and the most meagre plant means economy; far otherwise, we consider there is economy in an efficient plant and an efficient staff—in fact, that all the appliances which can save time or money is economy. The more efficient a mine is the more likely it is to succeed. With a property which is purchased at a moderate price, in a good natural position, with a sufficient quantity of ore of suitable quality, with careful selection and judicious economy, management alone is required to reduce it to a coining of money. At the present time there is a good market for properly selected manganese hematites of 40 to 50 per cent. of metallic iron, and we venture to say that Central Cornwall presents a metaliferous material worth the attention of ironmasters and investors. Engineers look with keen interest to the St. Columb district, where

they expect this popular branch of industry will take a strong hold, to the benefit of all concerned.

ANOTHER MONTH OF BRITISH MINING AND DEALING IN METALS.

Another month's report has been presented to the public as to the export of the product of our mines, and the competition of foreign metals, and the allegations made as to the perils to which British mining is exposed. When it is recollected how depressed the general state of the country has been, and of all countries which are our customers, trade in the produce of our mines, iron excepted, presents by no means an unsatisfactory account. The general imports and exports are compiled from documents at the Custom House, and under the new arrangements the statistics of shipping House, and compiled and arranged by the Board of Trade. It appears that the imports of all commodities for the last seven months have been valued at 27,747,000*l.*, a falling off of about 1,500,000*l.* from the corresponding period in the previous year, and over 2,000,000*l.* from the same period in the year before that. The total values of imports for the month last past was 31,876,808*l.*, not far from 3,500,000*l.* less than in July, 1875, and nearly 1,000,000*l.* less than in that month of 1874.

The value of foreign and colonial merchandise exported for the seven months of the year already passed was 6,817,040*l.*, more than 500,000*l.* less than in the corresponding period of 1875. So that this trade—a very important one—has fallen off for the seven months, but not at all to an extent claiming especial notice, for in two good years when compared there has often occurred a greater variation. Notwithstanding the chance decline noticed this branch of business is rapidly improving. The value of our exports of British and colonial merchandise for the month is considerably over 1,750,000*l.*, nearly double the average of the seven months' exports, and not far short of three times the value of those exports last month twelvemonths; and harkens ye pessimists, more than three times the value of this trade in 1874, comparatively with the last two years a year of starting trade.

But how stands our trade in the exports of foreign metals, the imports of which in some quarters (not in the *Mining Journal*) have excited so much alarm? Of zinc we export no foreign imports, because we want for ourselves the quantity which we import, all of it. Quicksilver imports are far beyond what we want, and we find a ready market for it in our colonies. It must be confessed that our trade in the export of that metal is declining as the United States is becoming able to supply itself from discoveries on the western side of the Rocky Mountains, and considerable amounts have passed into the Union from Mexico. The Continent of Europe supplies itself from Spain, now that order is restored. Notwithstanding this new condition of affairs, as affects that particular commerce, we sent abroad during the seven months quicksilver (all, of course, foreign produce) to the value of 155,493*l.*. The amount for the month is over its proportion, having been close upon 22,000*l.*, and this, let it be recollected, in the face of extraordinary low imports, which for the seven months were valued at 324,139*l.*, as compared with much more than half a million in that time last year, and nearly 600,000*l.* the year before. Nearly half the quicksilver we imported was sent away again with a profit, leaving us barely enough for its employment in the arts and the fine arts, so that stocks are unusually low, and the trade in this metal must for the remainder of the year be more considerable. It is estimated by excellent judges that the profits made on the re-export of quicksilver enabled us to pay for all we used ourselves, so that virtually these imports cost us nothing, and stocks of this metal here were never lower.

We import a considerable amount of iron, although ours is the greatest iron producing and iron export country in the world. What we import is chiefly for the purpose of making steel, and is derived from Sweden and the Iberian Peninsula. It is probable that the new patents obtained for turning British iron into steel will cause our imports from Spain and Stockholm to cease. Our imports this year amounted to the value of 1,793,881*l.*, and an additional import of steel to the value of 82,000*l.*. This shows some increase in the receipts of steel ready made all Swedish, but the iron values but little from preceding years. Of the imported steel nearly 50,000*l.* worth was exported, and of iron the worth of 206,000*l.* (round numbers being always given).

The imports of tin, blocks, ingots, bars, slabs, and regulus were of the value of close upon 750,000*l.* for the seven months. Instead of the English market being deluged with foreign tin the import has seriously fallen off, for during the same period last year it was worth nearly 1,000,000*l.*. There has, therefore, been a decrease of 25 per cent. What we received has been chiefly from the Straits of the great Eastern Archipelago, some little from Southern Australia, and notwithstanding the glowing announcements of discoveries in Tasmania, and an exodus from Hobart Town to the Six Clains, there is no authentic record of a single hundredweight arriving thence, although the finds are said to be in close proximity to the great line of railway connecting the two great ports; we might say capitals, for Van Diemen's Land virtually has two capitals.

Of this diminished import of tin 310,622*l.* worth was entered in the "re-exports." How, in the face of that fact, an outcry could be raised about the competition of foreign tin it is difficult to imagine. Our exports of foreign tin during this year have been over 50 per cent. more than in the corresponding period of last year, and, *mirabile dictu*, about 170 per cent. more than in the first seven months of the year before! We are absolutely importing much less foreign tin than last year, and re-exporting vastly more. It would require some new processes of reasoning under such circumstances to prove that foreign tin is closing Cornish mines. The import for last month is certainly larger than for the corresponding month of the last two years, but the value, nevertheless, was only 73,351*l.*, which was less than during any other month of the present year, while the re-export was to the value of 45,019*l.*—a great increase upon the outgoing of imported tin during the July of 1873 and 1874.

Copper ore was imported during the seven months to the value of much over half a million—an increase of about 30 per cent. over last year during the same time. The imports for the month were not on a corresponding scale, having been as large as 131,534*l.*, maintaining the same average increase over the corresponding months the last two years. All this ore was worked up in England; none whatever was exported. Regulus was received to the amount of 680,000*l.*—a very decided reduction upon last year's receipts, and upon those of the year before. During the month the value was 80,707*l.*, two and a half times as much as in July, 1875, but much less than half the value of July, 1874.

Unwrought or part wrought copper was received during the longer period to the value of 1,830,000*l.*—a falling off of nearly 400,000*l.* from last year, and of about 250,000*l.* from 1874. The month's receipts were close upon 200,000*l.*, below the average of the seven, and below the corresponding month of previous years. Of this "wrought and unwrought" copper we sent abroad again the enormous amount of 750,000*l.* in the seven months, and 138,000*l.* in the last of them. In both instances being an augmentation upon last year. Of lead imports the value was 996,000*l.* for the larger period, about 40,000*l.* less than in the space of time in the previous year. The amount for the month scarcely differs from that of July, 1875, and was 150,000*l.*. None of this lead was "re-exported."

The trade in metals, the production of British mines, shows a sad falling off in the totals of iron and steel. During the seven months the value was 11,848,559*l.*, a falling off of more than 3½ millions as compared with last year, and of nearly 6½ millions as compared with the year before. A comparison of the month of July in each year shows similar and results. It is here that the British miner and manufacturer has suffered. The stoppage of foreign loans accounts for it in great part, as large proportions of these loans were employed to purchase railway iron, locomotives, and steam-engines. There is not a branch of the iron trade where decay is not visible, and hardware and cutlery mill work and machinery present a similar decline. The trade in British copper has also fallen off, the value for the larger space of time having been 1,697,000*l.*, against 1,824,000*l.* last

year. The single month shows a heavy reduction upon the average monthly exports this year, and when compared with the same month in preceding years.

British tin proves a reduction of about 15 per cent. as compared with last year, and was not very much more than half the value of the year before. The month shows a similar decline, and is a lower than the average of the seven months. British lead presents a largely increased export over last year; the value for the past seven months was 457,000*l.*, and for the month 39,000*l.*, a decrease upon the July of both 1876 and 1875. The export of zinc and spelter, wrought and unwrought, is insignificant, but within its limits shows a decided and progressive increase. Such are the authentic facts of our commerce in metals as it is and recently has been; and these facts account for the condition of British mining in the present and recent past. But, except in the iron trade and iron mining, there is nothing to discourage the British miner or dealer in metals.

SIEMENS-MARTIN STEEL.

After the reference made by Mr. Mattieu Williams, in his last lecture on "The Iron and Steel Manufacture," to this process for making steel, some further account of it, as carried out by the Landore Siemens Steel Company, as also of the works themselves, where were produced the remarkable samples of "mild" or "semi" steel exhibited by the lecturer, will perhaps not be inopportune.

The works were started about seven years ago for the manufacture of steel under the patents of Dr. Siemens, who is Chairman of the company, and have since been considerably extended by the addition of the new works, so that the present area of ground occupied is now nearly 100 acres. The old and new works are together capable of an average production of no less than 1500 tons of steel a week, and give employment to over 1000 men.

The works are situated about three miles to the north of Swansea, in Glamorganshire, and being intersected by the River Tawe, and in close proximity to the Milland and Great Western Railways, are in a favourable position for receiving supplies of the raw material, and also of getting rid of the finished products. Coal is raised in the neighbourhood from the company's own collieries, and the limestone flux comes from the Mumbles, only a few miles off, being brought up the river in barges, but the hard blast ores of South Wales continue to high a percentage of phosphorus and other impurities for steel making, which requires the purest of iron ore. To meet this want, the company purchased a mine of their own, near Bilbao, but have, unfortunately, not been able to obtain a ton of ore from it during the late civil war; they have, therefore, had recourse to the famous red hematite ores of Whitehaven and Furness, and to a certain extent the less celebrated Mokke ore from Algeria.

The nature of the ground favours the arrangement of the blast furnace plant, which is situated at the old works. A double row of 100 coke ovens, on a level with the charging floor of the blast-furnaces, presents considerable features of interest. They are charged by trucks running on rails over the top, and are drawn by the chains attached to the cradles, previously inserted at the bottom of each oven, being connected to an endless chain passing over a pulley at one end, and worked by an engine at the other. Penrose and Richard's method of making coke by grinding together suitable proportions of anthracite, bituminous coal, and pitch from gasworks, has been tried with great success, a saving of 30 per cent. having been effected, while at the same time a good hard coke is produced.

Two furnaces of large dimensions have been built under a bank, in such a position that ore and coal can be run in trucks direct on to the top of one furnace, while a lift of only a few feet is required to make up for the difference in height of the other; both furnaces are close-topped, and are fitted with patent hydraulic brakes for lowering the charge. Both ordinary pig-iron and spiegeleisen are made in these furnaces as may be required; but a smaller furnace is also occasionally used for producing a spiegeleisen somewhat richer in manganese.

When the works were established it was intended to run the metal direct from the blast-furnace into the melting furnaces, and the relative position of the blast-furnaces and melting-house were arranged with this object; but it has never been carried out, and the charge for the blast-furnace is run into the ordinary "sows and pigs" in front of the furnaces.

When cold the pigs are conveyed in trucks to the Siemens regenerative melting furnaces, of which there are 16 at the new works alone, capable of turning out over 1000 tons of steel ingots a week. This production is brought up to more than 1500 tons a week by the eight furnaces at the old works, including two of large dimensions, equal to a charge of over 12 tons. Into these furnaces, instead of the molten metal being tapped, as usual, into a ladle, from which each ingot mould is filled in succession, the moulds are arranged in a circular frame, which revolves, bringing each one in turn under the ladle, so as to be filled by the charge running continuously from the furnace through the ladle and into the mould. By this arrangement a charge of nearly 14 tons of steel has already been run at a time, to form the ingot from which was rolled the first steel armour-plate that has ever been made. This was only by way of experiment; but on the slab, which was 3 in. thick, being planed at the edges to a size of 8 ft. by 3 ft. 6 in., and also through the middle, to see if it was homogeneous, the result was considered so satisfactory that more armour plates are to be rolled.

The furnaces themselves, both at the old and new works, are entirely built of silica bricks made on the spot from rock obtained in the neighbourhood; but the Siemens regenerative chambers are composed of Stourbridge bricks. The gas for heating the furnaces is generated in blocks of Siemens gas producers, and led in pipes and culverts under the floors to the furnaces, the current being reversed by the valve about every half-hour. The furnace bottom consists of good silica sand obtained from the same rock as that which yields the bricks. The charge for each furnace is properly apportioned by weight, and consists, as a rule, of 6 tons of good pig-iron containing no phosphorus, and not more than 0.05 per cent. of sulphur, 25 cwt. of pure steel or iron scrap, and from 30 to 35 cwt. of Algerian ore for decarburising. The pig-iron and scrap are first charged cold into the furnace, and when melted the ore is added from time to time in small quantities, until the carbon has been sufficiently reduced. The spiegeleisen is then added, sometimes cold, but more frequently after having been previously raised to a red heat in an ordinary melting furnace. As the spiegeleisen is added for the purpose of restoring the proper amount of carbon to the metal, its proportion depends upon the quality of steel required, whether hard or soft; but the percentage can be regulated exactly, even to the second place of decimals. To ascertain the proportion of carbon contained in the charge samples are taken out from time to time towards the close of the operation, quenched in water, and broken, when the fracture gives the necessary information to an experienced manager.

The ingots, after being re-heated, are hammered into blooms under the steam-hammer, and then either rolled off at once into plates, bars, rails, &c., or again re-heated before rolling. All the furnaces, however, are on the Siemens regenerative principle, no raw coal being used in the working of the metal. Rails and tyres are chiefly produced at the new works, where there is much to interest the visitor. After the rail—which may be 65 ft. long, to be afterwards cut into two—has passed through the rolls for the last time it is received on rollers made to revolve by steam, and by them brought up to a circular saw, which advances to the rail and cuts off the "crop" end, at the same time automatically putting out a hand, as it were, to hold the rail fast while being sawn. The rollers then take the rail on to a distance corresponding to its required length the rail is sawn off, and finally the remaining crop end. It is, however, found impossible to saw the rails off while hot to the exact length required, on account of the varying temperature, an consequently unequal contraction of the bar; they are, therefore, generally sawn off a little too long, and afterwards reduced to the standard length by a machine which takes a paring off the ends, at the rate of ½ in. per minute, leaving a square well-finished end. The operations of straightening the rails and punching the holes for the fish-bolts and fang-bolts are accomplished by powerful

presses. In punching the fish-bolt holes gauges are used for stopping the rail under the punch at the right place; but in the case of the fang-bolt holes the workman has no other guide than his eye in stopping the rail under the punch, which makes twenty holes in a minute.

In the manufacture of railway tyres, a circular bloom is first made, and a piece punched out under the steam hammer, thus leaving a slab of annular form, which then has an incipient flange formed upon it under a "beaking" hammer. After another "heat" in the furnace the tyre is finished in a tyre-mill, worked by hydraulic power, the only one of the kind at present in the United Kingdom.

The bar-mill, at the new works, is capable of turning out over 100 tons of bars a week, chiefly used up in the adjoining wire-mill, which is equal to a production of 90 tons of wire a week. This wire is of every degree of hardness, from the "special soft," for telegraph purposes, to piano-forte wire of great hardness and high tensile strength.

The "special" plates for the Admiralty, now being used in the construction of her Majesty's despatch vessels Iris and Mercury at Pembroke Dockyard, are rolled at the old works. They are brought out of the furnace for final rolling at almost a welding heat, and during the last passes between the rolls birch twigs are thrown upon them to generate carbonic acid gas and to remove the scale, while during the last pass of all the plates are washed with water by birch brooms. The consequence is that a remarkably fine surface is given to the plates, and the usual operation of scaling before painting is thus rendered unnecessary. The vessels above named are being built entirely of Siemens metal, with the sole exception of the rivets, but some severe tests, with a favourable result, have been applied to the metal by the authorities at Pembroke, with a view to employ it also for rivets.

These tests were described in a paper read in April last before the Society of Naval Architects, by Mr. J. Riley, the manager of the Landore Works, and have elicited from the Admiralty the opinion that this metal "works sound and well, and that rivets can be made of the steel with the same facility as of iron." Each separate plate is annealed in a large furnace recently erected to a design by Dr. Siemens, a test strip, 10 in. by 2 in., being invariably sheared off each plate. These strips may be planed to 1½ in. wide, but such confidence is felt in the toughness of the metal that the strips, merely rough sheared, are heated to cherry redness, quenched in cold water, and then bent double until the radius of the curve equals the thickness of the plate—a test they must stand without cracking. Other test pieces, 8 in. x 1½ in. x ½ in., with suitable ends, are inserted in the shackles of a direct-acting lever testing machine, arranged so that the weight of 1 cwt. at one end gives a tensile strain of 1 ton at the other. The strips are then pulled apart by continued increments of load, the Government specification providing that the tensile strength shall not be less than 26 tons, nor more than 30 tons.

In the testing house is a large collection of pieces of steel of various shapes, subjected to all kinds of torsion, bending up, twisting, and even tying into knots in a cold state, to show the remarkable tenacity and uniformity of composition of this metal of the future, which is at present, for the want of a better title, distinguished by the name of "mild" or "semi" steel.

—Journal of the Society of Arts.

HYDRO-METALLURGY.

There are probably few departments of metallurgical industry to which more attention has been given by inventors, and few which have proved more disappointing to capitalists, than that which is very properly described as hydro-metallurgy, or the extraction of metals from their ores by the wet way—the reason of the disappointment being obvious to all who have had any experience with the manipulation of ores, or the manufacture of metals—in the smelting process, or reduction by the dry way, the great mass of the impurities is removed in the preliminary operation, so that the theoretical disadvantages represented by more than one process being employed, and by a very small proportion of the metal sought being lost in the treatment, is more than counterbalanced by the economy with which the remainder is rendered marketable. The same objection which was so ably pointed out by Mr. J. Lowthian Bell when explaining the futility of attempting advantageously to obtain malleable iron direct from the ore prevails with regard to the extraction of metals by the wet way, and this latter has the additional disadvantage that scarcely two consecutive parcels of ore can be obtained to which the same process is applicable. The success achieved at Widnes and other places similarly circumstanced is frequently held up to capitalists to induce them to expend their money on testing wet processes; but it should be remembered that at Widnes they have a comparatively uniform raw material, and that the ore from which that raw material is produced is of one peculiar quality, and has already been submitted to a fire process for another purpose—the manufacture of sulphuric acid. Were the attempt made at Widnes to work the raw ore by Cauley's process failure would inevitably be the result; and even if the attempt were made to manufacture the sulphuric acid in Spain, where the ore is raised, but where only imported fuel is available, and there is no market for the acid, there would be similar failure in that part of the process. Hence, it is not difficult to see that the objections raised by Cornishmen to the adoption of the wet way for the extraction of metals from Cornish ores does not arise entirely from prejudice, as some have asserted, but from the conviction that capitalists will be disappointed with the results, and that the disposition to embark in legitimate Cornish enterprise will thus be lessened.

Amongst the most recent hydro-metallurgical processes invented is that of Mr. H. Hutchinson, of London, and the difficulties to be contended with may be judged of by the circumstances that he has deemed it advisable to include in his invention improvements in the apparatus and mode of manufacturing the sulphates of soda, of potash, and of the alkaline earths, hydrochloric acid, and chlorine, which would indicate that none of the re-agents—obtainable where hydro-metallurgy is successfully carried on as by-products, and at nominal prices—are readily obtainable. If these could be obtained at nominal prices in Cornwall, and if some of the objectionable ingredients in the Cornish ores could be inexpensively eliminated, the economic extraction of the metals would be possible, and it is equally to the advantage of the inventor and of the capitalists that these points should be fully and publicly discussed before any large expenditure is incurred in the effort to develop a process of so elaborate a character. Both science and practical experience should receive the consideration to which they are entitled, but the supposition that because science has done much everything treated of in scientific language must be correct is likely to prove deceptive. Hitherto, however, the use of red-hot air has not been attempted in metallurgical operations, so that Mr. Hutchinson may fairly be acknowledged to have made at least some progress, more especially from the description which he gives it is evidently red-hot atmospheric air which is referred to, and may, therefore, anticipate success.

The object of the invention next, to the production of the re-agents already mentioned, is the treatment of metallic sulphides with a view to extract and separate from each other their metallic contents; the manufacture of sulphates of magnesia, alumina, iron, zinc, cobalt, nickel, copper silver, and lead; and the separation of gold, the utilisation of sulphurous acid gas in the fabrication of the chlorides and sulphates, and the concentration of metals by the chemical method of treatment. To obtain the alkaline sulphates by the methods now in use recourse is had to decomposition of the alkaline chlorides, and in some cases the chlorides of the alkaline earths—first, by means of sulphuric acid; and, secondly, according to a more recent method of passing red-hot sulphurous acid fumes (the inventor has evidently a partiality for red-hot gases) over common salt alone, or a mixture of common salt and oxide of iron, or other oxide or chloride of potassium moulded into various shapes, such as bricks, perforated bricks, balls, squares, and lamps mixed with spent oxide of iron and clay placed on perforated shelves in suitable decomposing chambers, the object being to expose as large a surface as possible to the action of the sulphurous acid, steam, and air, and thus to produce sulphates of the alkalies without first

converting the sulphur into sulphuric acid. He further explains that by roasting a mixture of alkaline chlorides and metallic sulphides in reverberatory furnaces, the result being in each case the sulphate of the alkalies or alkaline earths, and in the latter case the chloride of the heavy metals and hydrochloric acid. Should the invention prove successful, the advantage to Cornwall and many other similarly situated mining districts will be enormous, and the existing views of chemists will have to be very materially modified.

GREAT WHEEL ELEANOR TIN MINE, NORTH BOVEY.

It is only natural that we should be somewhat interested in the successful development of new mines in the West of England, for it cannot be denied that the great depth at which most of our best mines in Cornwall have to be worked is in many instances an insurmountable obstacle to the remuneration to which mining speculators are fairly entitled.

It is, then, to the new and shallow mines adventurers will have to look for the more safe and profitable employment of capital with a prospect of quick, substantial, and lasting returns; and we hail with satisfaction the various efforts which are now being made in Devon to open up and successfully develop mineral ground the character of which is clearly indicated by the very numerous Phoenician stream workings in and around the neighbourhood of Moreton Hampstead. On one or two occasions we have had to notice the steady progress made at the Great Wheel Eleanor, and we now proceed to give a further account of this promising enterprise, carried on, as it may be said, by an entirely local party, and with a zest which only could have been maintained by well-grounded confidence in success.

It is a little more than a year ago when (after several lodes had been cut, and the property sufficiently proved to justify further and more important outlay) the company commenced laying out the mine, under the superintendence of Stephen Matthews, the engineer. The counting-house, carpenters and blacksmiths' shops, engine-house, boiler-house, and other offices have all been erected; and a 200-horse engine purchased from Messrs. Lanyon and Co., of Truro, with 28 heads of stamps, were set to work on Monday last for the first time, in the presence of a large number of shareholders and visitors, who expressed their unqualified satisfaction at the ease with which the entire machinery worked. By the permission of the courteous resident agent, Capt. Tredinnick, samples from two or three lodes were vanned, and each contained samples of very fine tin in good paying quantities, whilst that from the western level seemed to average about 5 per cent. This lode should be pushed on with all possible speed, as it is evidently improving.

The dressing-floors are rather extensive, and if they are enabled to keep all the buddles erected in full work (as from the enormous quantity of backs they have ready for stopping they seem likely to be able to do) the returns of tin must be something considerable, as the lowest adit is nearly $\frac{1}{2}$ mile perpendicular from the top of the hill. The advantages they have in the way of economy are most remarkable. The land being so peculiarly adapted without much excavation for laying out works to any extent. We were told by the secretary (Mr. F. Thomas) that ignorant prejudice had done much to discourage the undertaking, and had not the management been in the hands of men who were not to be easily thwarted it is very likely that what bids fair to be one of our most important tin mines would have laid dormant for a considerable time to come, but energy and perseverance seem to have overcome many drawbacks, and our advice is to go on and prosper, for, with the present aspect, there is very little doubt we shall receive from time to time many gratifying reports of the Great Wheel Eleanor.

NORTHERN MINING PROSPECTS.

Now that there is a more settled outlook in commercial matters in the locality it may not be uninteresting to attempt to trace the positions and prospects of the mining industries in the North, which, as a whole, has long taken the leading position amongst the mining districts of Britain. Of the lead ore raised in the United Kingdom nearly a quarter is brought to the surface in Durham and Northumberland; the same two counties contribute a fourth of the total output of coal in the kingdom, and one-half of the iron ore produced in England is raised in Cleveland, so that the position assigned to the mining districts of the North is fairly due to it. It may, however, best serve the purpose if the exact figures of the output be given, and the development of the industry may also be shown by a comparative table of the product of the mines 15 years ago and at the present time. The product of the districts named—Northumberland and Durham for coal and lead, and Cleveland for ironstone—was as understated for the respective years named:—

	1861.	1874.
Coal.....Tons	21,548,965	30,543,800
Ironstone.....Tons	1,231,261	5,614,322
Lead.....Tons	19,536	18,539

The figures given are the latest yet published in the Mineral Statistics, which are adopted, although in the earlier period some authorities give outputs slightly varying, but the differences are trivial, and do not affect the value for comparative purposes. They show, as regards the coal and iron mining industries, not only a vast development in the amount, but, more especially in the latter case, they also evince an increased production far above the general increase of the country. It is not the case with the older industry of lead mining, there being a slight decrease in the amount of lead ore raised, but it may be added that that decrease has been less than the ratio of decrease in the kingdom, for the amount of lead ore raised fell from 90,668 tons in 1861 to 76,151 tons in 1874. So far as unofficial returns allow us to judge, the ratio of increase in the production of coal and iron was kept up in the North last year, and there was a slight increase in the lead ore raised, but it is well known that, so far as the two chief industries are concerned, this year has witnessed a depression which will at least mark itself by a stoppage of the increase. This, however, may be not shown in the returns to the extent supposable, for there was to some extent a stocking of coal and iron at pits and works, so that, although the amount put into consumption is less up to the present, the output has not been so seriously lessened as it would have been but for certain disturbing influences, such as the South Yorkshire strike, which cleared away some of the accumulated stocks of coal at the Durham collieries.

First looking to iron mines, it may be said that hitherto the dullness in the whole of the iron trade and the stagnation in one of the branches of finished iron have shown themselves chiefly in the closing of some of the small mines away from the chief centres, and in the closing of one of the "leaner" mines, near Guisborough; but in the chief mines of Cleveland a normal output has been nearly if not fully kept up to. It has been, however, at the expense of some stocking of stone at mines and works, and it is evident that this policy cannot long be persisted in, and more especially if the movement of reducing the make of pig-iron by the blowing-out of blast-furnaces be followed up, as is probable, to a limited extent. It must be borne in mind also, however, that the amount of pig-iron in the hands of the makers is not likely to be much further increased, for the minimum price is almost touched, and it is now so low that purchase is a safe speculation. These considerations will probably tend to influence the output from the Cleveland mines by slightly lessening the output, possibly by the working of short time, but it will be partially only; and it is tolerably evident that no great reduction in the output need be apprehended. And there are possibilities now in course of proof which cannot but result favourably to the northern iron trade, and which may benefit it in an extraordinary measure, so that the prospects of the Cleveland mineowners are one, on the whole, more assuring.

Somewhat singularly, the northern coal trade is now more seriously affected by the dullness in the rail trade than in the manufacture of crude iron, for the latter in the North has largely made itself independent of the rail-mills. And, but in a smaller degree, the coal trade is also finding fresh markets for the produce thrown upon its hands by the closing of so many finishing ironworks. It is almost solely to this that the dullness in the coal trade is traceable, for although there is a slightly diminished demand for coke,

it is comparatively a trifling loss to that of the vast diminution in the requirements of the finishing branches of the iron trade. The household requirements are low just now, but it is the usual dullness in the hot season, and as the summer passes a resuscitation of the large demand is known. There is also an increased export trade in coal and coke from the northern seaports this year, and this and the larger domestic consumption have in degree mitigated the dullness induced by the want of demand for malleable iron purposes. In spite of this mitigation, there is in Durham and Northumberland a large amount of labour only partly employed, by the laying idle of one or two collieries, and by the working of short time at some of the pits—in one district only half-time having been worked for some months. But an adjustment of labour to demand has in this case been witnessed rather singularly. Four years ago a strike in the lead mining districts, and the high rate of wages then ruling at the coal mines, induced many dalesmen to leave the lead mines and to go to work in the Auckland colliery district, but towards the close of last year and during the early months of this an exodus was witnessed from the coal to the lead mining districts, and thus labour has largely adjusted itself to requirements in Durham.

It may be now anticipated that as the shipping season draws to a close a "spurt" will ensue which will favourably affect the coal trade, and, corresponding in time with this, increased domestic requirements will be made manifest. It may also be taken as almost certain that any change in the demand for iron trade purposes as a whole will be towards increased consumption, so that with the coming winter a brighter prospect for the coal trade of the North may fairly be looked for.

As to the minor, but older, industry of lead mining less can be said. At present there is in the Durham district, at least, a likelihood of a greater output. In Weardale and Teesdale there are extensions of mining in progress, and there is an increased amount of labour employed. Many of the Teesdale mines have been much more prosperous of late, and the average amount earned by the workmen has risen. The tendency, on the whole, of lead in the market is upward in price, and this is naturally very speedily reflected in the producing districts. And it is gratifying to notice that the efforts are proving successful to systematise the mode of working lead mines. Machinery for washing ore is being successfully introduced, and attempts have been made in Teesdale to utilise the vast stores of peat in the smelting of lead, so that it may fairly be believed that the depression long overshadowing lead mining has passed away. On the whole, then, the prospects of the northern mining industries are promising better things than the dull present. These improved prospects may not speedily crystallise into fact, but they are none the less evident in the future, and they form the silver lining to the cloud of adversity which has long hung over the mining districts of the North.

WINNING COAL WITHOUT BLASTING.

The numerous explosions in collieries, especially in the Wigham district, attributable to the careless use of gunpowder have caused serious consideration to be given to the question whether it cannot be dispensed with altogether. It is with this object that Messrs. G. Dingley, jun., and W. Ackers, of Lower Ince, have brought forward an invention, the object of which is to facilitate the winning or getting of coal from its natural bed by breaking down after undercutting, or by breaking out from the solid, and to do so by simple and efficient hand apparatus and appliances, dispensing with cumbersome power machines, and the danger, inconvenience, and expense of blasting. For these purposes a hand drilling machine is employed to bore a deep hole in the coal, and afterwards a breaking-down tool or appliance is used, which latter, after being inserted in the drilled hole in the coal, is caused to expand or open by the action of a long wedge, driven thereto by repeated blows from a hand hammer, and force the coal from its bed.

The framework of the drilling machine is provided with screws or like means for securing it between the floor and the roof of the mine in the desired position. Toothed wheels or other gearing are carried on the framing, and a handle is attached to one of the wheels or its shaft to cause them to rotate. One of the wheels encircles the drilling bar or rod, and imparts rotary motion to it. The said drilling bar carries a cutting tool, preferably one to cut an annular groove at front, and the bar and tool are fed forward during rotation by a screwed thread on a sleeve surrounding the bar and entering an exterior sleeve. The expanding tool or appliance is made in two or more (two are preferred) pieces, forming exteriorly when placed together a circle in transverse section, and are of about the length of the drilled hole. They are so formed as to be easily passed into the drilled hole. In the interior of the said pieces are grooves to receive a long wedge, which latter is driven by blows into the two or more pieces, and their expansion effected so as to break down or break out the coal.

It will be obvious that the boring bar can be adjusted to the face of the work or removed therefrom by loosening the set screws and sliding the said bar in or out. To save time, when the boring bar has worked into the coal the full depth of the screwed sleeve the nut is formed in two halves, hinged together and secured by a catch, so that the said nut can be opened, the screwed sleeve withdrawn, and the boring bar adjusted without the necessity of screwing the sleeve back again. They prefer that the end of the boring bar should be provided with a cutting head of such a form that the coal will be removed in washers or rings. The wedges are sometimes provided with rollers to reduce friction. As both the inventors are working men it may be hoped that the apparatus will have a fair trial, and prove successful.

CONVERTING CAST IRON INTO STEEL.

Important improvements have from time to time been introduced by the Foundries and Forges Company of Terre Noire la Voulté and Besseges, France, for converting cast-iron containing phosphoric impurities into steel or metal having the properties of steel, and they have now patented some further improvements. By their patents of 1874 and 1875 they claimed the manufacture by the Bessemer process of steel from cast irons more or less mixed with cinder iron and scrap iron, the cast iron, cinder iron, and scrap iron being of any origin or quality whatsoever, provided that the aggregate does not contain more than four parts of phosphorus in the thousand, and that it has been shown the method of manufacture—that is to say, by using to finish the operation alloys rich in iron and manganese, or iron and silicon. And, further, the manufacture of steel by the Siemens-Martin process using cast iron and scrap iron of any origin and quality whatsoever, provided that the mixture contains not more than four parts of phosphorus in the thousand, and it has also been shown that this operation can only give working results by using as a final addition alloys rich in iron and manganese, or iron and silicon. But it may happen that cast iron suitable for the manufacture of Bessemer steel—that is to say, containing the proportions of carbon, silicon, and manganese most conducive to the success of the operation—should be too costly or too difficult of production, whilst cast irons can be cheaply obtained, which from their composition could not be worked in Bessemer's apparatus, and which, notwithstanding the phosphorus contained, would be suitable for converting into steel by the Terre Noire processes. When the difference of prices between such cast irons and the cinder irons at command is such that there is an advantage in increasing the proportions of finished cast iron one of the Siemens-Martin processes consists in refining these cast irons either completely or partially by introducing into the bath oxidizing materials, such as ores of iron or manganese, metallic scoria, or even mineral salts, which by their decomposition disengage oxygen. It is even possible to omit the scrap iron altogether and use only cast iron and oxidizing materials.

The improved process of conversion constituting the present invention produces steels of very good quality can be obtained by melting in a furnace, whether with fixed or moveable bottom or whatever may be the plan of furnace, impure cast iron containing up to four parts of phosphorus in the thousand, and in refining these

cast irons by metallic oxides or scoria or salts, provided that the operation is always finished by an addition of ferro-manganese, and adding only insignificant proportions of carbon. By these processes alloys of iron and manganese can be obtained, containing as much as 65 per cent. of manganese, and the use of these alloys render the process of conversion more certain and less costly. The chief feature of novelty are the using as a final addition in manufacturing steel by the processes mentioned rich alloys of iron and manganese in the proportion of from 30 to 80 per cent. of manganese or iron, and in proportion to the quantity of manganese that is added to the bath, whether 1 or 2 per cent. of the manganese, or $\frac{1}{3}$ or 1 per cent. of silicon, starting with cast iron of a phosphoric nature, containing as much as four parts of phosphorus in the thousand, and refining the cast irons by metallic oxides, scoria, or oxidizing salts in any apparatus whatever. In carrying out the process the workmen take phosphorus, selecting that which is white by preference; proceed to melt it in a furnace, such as that known as the Martin-Siemens furnace, or other known furnace, either fixed or moveable, capable of giving the same degree of heat, or introduce the liquid or semi-liquid iron in one of the said apparatuses and proceed to refine it by the successive additions thereto of rich minerals, containing not more than three parts in the thousand of phosphorus; when the refining is so far advanced that the metal only contains traces of carbon, they add to the bath from 1 to 24 per cent. of ferro-manganese containing at least 50 per cent. of manganese, and mix and run it. Metal obtained by this simple and economical process contains from one to four parts in the thousand of phosphorus and traces of carbon and manganese, and is well adapted for all the uses to which steel is now applied. It is mentioned that ferro-silicium may be substituted for the ferro-manganese when desirable.

Meetings of Public Companies.

WYE VALLEY RAILWAY COMPANY.

The fifth ordinary general meeting of proprietors was held yesterday at the City Terminus Hotel, Cannon-street.

Mr. W. HAWES, F.G.S., in the chair.
Mr. F. E. MARDON (the secretary) read the notice convening the meeting, and then affixed the seal to the register of shareholders. The report of the directors was taken as read.

The CHAIRMAN said: Well, gentlemen, we have met here to-day to receive a report and to afford a good many explanations which have been requested from various shareholders who have addressed me upon the subject since the issue of the notice for the special general meeting. I will first confine myself strictly to the business of the ordinary meeting, and then I will take the business of the special meeting. We have obtained, as you know, an Act of Parliament giving us power to make various improvements in the line, and to make connections with works and railways adjoining us, and in order to accomplish that the Act of Parliament has given us power to raise 105,000*l.* with the usual borrowing powers. Hence it will be seen that the directors have retained "the opinion previously expressed that the works empowered to be undertaken under this Act would be effected with material contribution to the best interests of the company." Now, I am rather anxious that you should thoroughly understand the meaning of that paragraph, and that you should know, as far as the directors are able to form an opinion, that this additional capital will be not only a good investment, but that it will materially improve the property of the whole line. There can be no doubt, from all the experience we have before us, that a wharf and seaport connection as a terminus of a railway is of great importance. We know how much several large railways in the West of England have spent in order to obtain connections with the docks and shipping ports, and here we have a connection with a wharf at Chepstow where there is plenty of water and great facilities for shipment and disembarkment at a very small cost, and we believe that the income to be derived from these wharves, and more especially from the increased traffic which will be brought upon the railway, will produce a very beneficial effect upon the future prospects of the railway. Then, beside the wharf, the income of which we estimate at a considerable sum, we have the export and coasting trade from there, which likewise we regard as of considerable value. Moreover, we have the communications we shall make on the line, and I have no doubt when we are in a position to go before them with specific estimates that they will contribute towards the cost of making the various junctions contemplated effecting with them. That is all, gentlemen, I can say with regard to additional capital. The Great Western have required us materially to increase the stations beyond the dimensions at which they were originally laid out, and that will cost (and has cost) us a considerable sum, which I may add is included in this estimate of 105,000*l.* That sum, therefore, does not represent an increase of capital simply for new works, but it is also to enable us to carry out the requirements of the Great Western Railway in order that they may take full advantage of our line. Now, inasmuch as the Great Western will pay us 5*l.* per cent. of the total traffic receipts on our line, it was desirable that we should agree to extend the accommodation afforded by our railway, provided, of course, that they could show such extensions would produce increased receipts, so large a proportion of which is to be paid over to ourselves. (Hear, hear.) Now you have all so doubt received a circular from a shareholder, the pleasure of whose acquaintance I do not possess, indeed I do not even know whether he is in the room.

Mr. C. FERRARD: I am present, Sir.
The CHAIRMAN: A circular, gentlemen, which I must notice, and I think when I have noticed it the gentleman who has addressed it to you will say that he is not quite correct in some of the statements he has made. In one paragraph Mr. Ferrard says—"I was much struck by a statement of your Chairman at a former meeting that the obtaining of this Act of Parliament would not cost the shareholders a sixpence." Now, I have looked at the reports of previous meetings, and I cannot find a word to justify that remark. I certainly cannot believe that you should have been so thoroughly ignorant (I must call it that) as to suppose that an Act of Parliament could be obtained without cost. Such a thing was never known; on the contrary, we all know that they cost a great deal of money. I think I stated that as clearly and distinctly as I do at the present moment. Then, as to the other paragraphs of this circular, I do not know that they require any special notice. Mr. Ferrard is good enough to say that the directors do not hold large qualifications. That is quite true, but then he adds that the position of those who are your directors justifies the belief "that they will conscientiously carry out what they believe to be their duty by the line." Well, having said so much, I will only add the hope that the proxies entrusted to Mr. Ferrard in consequence of that letter will, before the meeting terminates, be used in our favour as well as the others I have before me.

Mr. H. HILL thought it would be well that the Chairman should state the number of shares held by each member of the board. He thought it a most extraordinary thing that gentlemen in the position they filled should hold only a small stake in the company.

The CHAIRMAN, while admitting that he was a small shareholder, said he did not think it right to call upon a chairman to state how many shares he and his colleagues held. He, therefore, declined to answer the question. He had no objection to join the company when it was in great difficulty and distress, and he might assure the shareholders it had caused him considerable trouble and anxiety to bring the undertaking into its present state. He was glad to say that within 14 days from the present time an appointment would be made with the Government Inspector to go over the line preparatory to its being opened. (Hear, hear.) Replying to other questions, the Chairman said that there would be a certain amount of excess (not a large one—about 20,000*l.*) over the original estimate of the cost of the line. The dividends referred to would not be executed unless the parties primarily interested consented to share the expense. With the shareholders, he deeply regretted the delay which had taken place in the completion of the works, a delay which had no doubt entailed considerable extra expense on the company in the shape of loss of tolls, &c. Unquestionably Messrs. Reed, the contractors, were liable to a penalty for the delay which had occurred, and he should be most happy to endeavour to obtain from them some indemnity for the loss the company had sustained; but at the same time it was not to be supposed he held out much prospect of success.

The CHAIRMAN then formally moved "That the report of the directors be received and adopted."—Capt. J. W. HOWE seconded the resolution.
Mr. C. FERRARD said: Mr. Chairman and gentlemen, there is one thing which we shall all hear with pleasure, that within 14 days this railway is to be opened.

The CHAIRMAN: No, the Board of Trade Inspector is to pass it. I simply said that notice has been given to the Board of Trade that the line will be ready for inspection in 14 days time.

Mr. FERRARD: Well, then we may congratulate ourselves on the fact that this railway is at length to be opened. It was incorporated by an Act of Parliament in 1865, which Act limited it to five years. It is now ten years, but I have no doubt we might have hoped that in a short time—the term having had a sufficient period allowed in which to develop itself—we should be in receipt of a steady return upon the capital we had invested in this undertaking. But upon reading the report of the directors, dated February 1876, I observed that the board were about going to Parliament for a new Act, and it appeared to me that they gave

HOLLOWAY'S OINTMENT AND PILLS.—In all outward complaints a desperate effort should be made at once remove these annoying infirmities, and of establishing a cure. The remarkable remedies discovered by Professor Holloway will satisfactorily accomplish this desirable result, without any of those dangers or drawbacks which attended the old method of treating ulcerative inflammations, scrofulous affections, and scorbatic annoyances. The most timid invalids may use them with the utmost safety without success, provided a moderate attention be bestowed on their accompanying "directions." Both the preparations soothe, heal, and purify. The one assists the other most materially in effecting cures and renewing strength by helping exhausted Nature, just when she needs such succour.

worth 1 ton per fathom. The 92 cross-cut, north-east towards south lode, is driven 14 fms. from Tankerville lode, and the indications point to the cutting of a lode soon. The stope in the 82, east of shaft, by four men, at 6f. 10s. per fathom; lod 2 fms. 2 tons per fathom. The stope in the 74, west of Watson's, by four men, at 7f. per fathom, worth 1 ton per fathom. The new pumping-engine is working well.

TANKERVILLE.—A. Waters, Aug. 24: Things going on here as usual. There is no material change to write about since my report of the 21st inst.

TREEB GH CONSOLS.—J. Gifford, Aug. 24: All the works on the mine are being pushed on with all speed, and we hope to set the drawing-engine to work on Friday next, and to complete the pumping-engine by the same date.

WEST GILCOLPHIN.—John Pope, Aug. 15: Setting R-port: Canner: The 60, driving east, by six men, at 4f. 6in. wide, worth 10f. 2f. wide, worth 12f. per fathom—producing tin; for the length of the shaft the ground is more favourable for sinking, and the lode is improving in appearance for tin. The 60, driving north, by two men, at 4f. 10s. per fathom; lode 2 ft 6 in. wide, worth 3f. per fathom—producing tin. Wilson's: The 60, driving west, by six men; we have cut into the south or main part of the lode close to the end 2 ft., but have not reached the south wall; this part is w with about 10f. per fathom; as soon as the lode is properly cut through I shall set the men to drive west. The 61, driving east, by two men, at 4f. 6in. wide, worth 10f. 2f. wide, worth 12f. per fathom—producing tin. The 50, stopping bottom west, by six men, at 4f. per fathom; lode 7 ft. wide, worth 20f. per fathom—producing tin. No. 1 stope in back of the 50 by four men; the part of the lode we have been carrying is 4 ft. wide, worth about 8f. per fathom, but there is small branches of tin going off in each side of the workings, so I have not the men to strip down the sides to see how it looks before I stop any more. No. 2 stope in back of the 60 west by four men, at 2f. 15s. per fathom; lode 4 ft. 6in. wide, worth 2f. per fathom; lode 2 ft. 6in. wide, worth 10f. 2f. wide, worth 12f. per fathom—producing tin. The 40, driving west, by two men, at 3f. 10s. per fathom; lode 3 ft. wide, worth 6f. per fathom—producing tin. The 40, stopping back east, by four men, at 2f. per fathom; lode 3 ft. wide, worth 2f. per fathom—producing tin. The 30, stopping back east, by two men, at 2f. per fathom; lode 2 ft. 6in. wide, worth 10f. 2f. wide, worth 12f. per fathom—producing tin. The 20, driving east, by six men and one boy, at 2f. 10s. per fathom; lode 4 ft. 6in. wide, worth 4f. per fathom—producing tin; I calculate this level is about 6 ft. behind Boulton's shaft. The middle adit, driving west, by four men, at 3f. 10s. per fathom; lode 2 ft. wide, worth 4f. per fathom—producing tin. We have four men stripping down the side of the 60, west on Wilson's lode.—Canner: The 60, stopping back and bottom south, by two men, at 10s. in 1f.; lode 2 ft. 6in. wide, worth 5f. per fathom—producing tin.

WEST MARIA AND FORTESCUE CONSOLS.—Wm. Skewis, Aug. 23: West Maria Lode: We have this week cut through the lode at the 104 east, and find it 5 feet wide, composed of apatite, spar, copper, and munda, but not to value. In the counter lode there is no change to notice. North Lode: The lode in the 71 west, at 3f. 30s. wide, at 8f. 10s. per fathom, and in the 60 west it is 3½ ft. wide, worth 5s. 6d. a ton, for copper and munda, and likely to further improve. There is no other change to notice.

WEST MILWR.—William Francis, Aug. 24: The cross cut south from the West Meadow shaft has been driven past the two east and west portions of what would appear to be in connect on with the silver vein, and I am expecting continually to cut the main branch of the lode, which will in all probability give immediate returns of lead ore, and bring the connection into a profitable state.

WEST FATELEY BATH.—D. Williams, August 24: Every point in the mine is now the same as represented in my last.

WEST TANKERVILLE.—A. Waters, Aug. 24: The boundary shaft, sinking below the 75, is down 4 ft.; ground of the usual character. The 75, south of shaft, is improving; now worth 1½ ton per fathom. The 67, south of shaft, is without change since last reported on. No. 1 stope in this level south is worth 1 ton; No. 2 stope, 1 ton; No. 3 stope, 2 tons; No. 4 stope, 1½ ton per fathom. No. 1 stope, in back of 60 south, is worth 2 tons; No. 2 stope, 1 ton per fathom. No other change to notice this week.

WHEAL KILTY.—J. St. Agnes, Aug. 22: There is no change in the 130 east. In the 8 east the lode continues to look very well, and is now 5 ft. wide, worth fully 40f. per fathom. There is scarcely any change in the 72 east, which is looking much the same as for several weeks past. In the 45 east we have just passed through a small ore s-course, and at the present time the lode is not quite so ore, but is still very promising, and I think will shortly improve. The lode in No. 1 stope, in the back of the 48, is 4 ft. wide, worth 10f. per fathom. The lode in No. 2 stope, in the back of the same level, is 6 ft. wide, worth 25f. per fathom.

WHEAL GREEN BATH.—D. Williams, Aug. 24: The drift between the lode in the 150 and the 130 east is 8 ft. wide, worth 10f. per fathom. The lode in the 130 east end is worth 12f. per fathom. The lode in the 130 west end, on the old lode, is producing low-price tin-ore.—North 83 ft: The rise in the back of the 140 is worth 8f. per fathom. The lode in the 130 east end is worth 9f. per fathom. The stopes on the whole are worth out any change worthy of notice since my last. We have cleaned and repaired one of our boilers at the pumping engine this week, and set it to work to day.

WHEAL KILTY (St. Agnes).—Stephen Davy, Richard Harris, Aug. 19: New Shaft, Pryor's Lode: In the 100, driving east, the section has been raised to the level of the 100, driving east, its being unusually flat. It is producing good stones of tin, and indications of being productive as laid open. The lode in the 142 fm. level, driving west of shaft, is 6 ft. wide, and worth for tin 10f. per fathom. The lode in the 142, driving east of the shaft, is 2½ ft. wide, and worth for tin 9f. per fathom. The lode in the rise in back of the 142, west of shaft, is 3 ft. wide, and worth for tin 10f. per fathom. The lode in the 130, driving west of shaft, is worth for tin 15f. per fathom. We have commenced sinking a winze in the bottom of the 130 west, but have not taken up the lode. The 100, driving west of shaft, is 3 ft. wide, and worth for tin 7f. per fathom. The lode in the 100, driving west of engine-shaft, is 2½ ft. wide, and worth for tin 11f. per fathom. The lode in the 100, driving east of engine-shaft, is 2 ft. wide, and worth for tin 5f. per fathom.

WHITEHAVEN IRON MINES.—T. Rosewarne, Aug. 17: The new drift in midway, above No. 1 drift, has been worked by four and six men, 9 fms. 1 ft. 2 in., at 8f., 3f., and 1f. 10s. per fathom. In driving this drift we discovered the main footwall of the lode with a small vein of ore in it. This drift will soon be completed, when I shall put men to rise and to stope ore in the back, where the lode is large, and apparently very good. The rise in the back of No. 1 drift has been put up 1 fm. 4 ft., by two men, at 4f. and 7f. per fathom; the lode is large, but very spare for working. In the 100, driving east, the section has been raised to the level of the 100, driving east, its being unusually flat. It is producing good stones of tin, and indications of being productive as laid open. The lode in the 142 fm. level, driving west of shaft, is 6 ft. wide, and worth for tin 10f. per fathom. The lode in the 142, driving east of the shaft, is 2½ ft. wide, and worth for tin 9f. per fathom. The lode in the rise in back of the 142, west of shaft, is 3 ft. wide, and worth for tin 10f. per fathom. The lode in the 130, driving west of shaft, is worth for tin 15f. per fathom. We have commenced sinking a winze in the bottom of the 130 west, but have not taken up the lode. The 100, driving west of shaft, is 3 ft. wide, and worth for tin 7f. per fathom. The lode in the 100, driving west of engine-shaft, is 2½ ft. wide, and worth for tin 11f. per fathom. The lode in the 100, driving east of engine-shaft, is 2 ft. wide, and worth for tin 5f. per fathom.

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The business in British lead mining shares has been very dull, notwithstanding the fact that lead is the only metal which retains a high price in the market. Van, 37 to 39; there is no particular change mentioned in the usual monthly report, which will be found in another column. The four-weekly sale, on Thursday, 550 tons of lead and 100 tons of blende, realised 81117.17s. 6d. Van Comol 18 to 19; every effort is being made to complete the new shaft; is now timbered and squared up with ladder-ways to the 70 ft. surface. Great West Van, 11s. 3d. to 13s. 9d.; the improvement lately reported are said to have thrown considerable light on

COMPANIES REGISTRATION.—The large sum of 21,103*l.* 10*s.* was realised by stamps in the registration of companies in the year ending March 31 last.

COAL AND IRON IN THE UNITED STATES.—The demand for iron coal has been comparatively limited at Boston, and no sales of importance have been reported. English and Scotch coal have, however, been taken at Boston in retail lots. In Cumberland (Maryland) coal there has been no change at Boston; gas coal has been quiet, as all the leading gas companies are well supplied. Anthracite coal has been dull at Boston; the retail prices of anthracite range from \$6½ to \$7 per ton; large lots are obtainable at 25 cents to 50 cents per ton less. The total production of anthracite coal in Pennsylvania to July 29 this year amounted to 8,943,800 tons, against 9,412,850 tons in the corresponding period of 1875, showing a decrease of 469,056 tons this year. The production of bituminous coal in Pennsylvania to July 29 this year amounted to 1,993,262 tons, against 2,058,800 tons in the corresponding period of 1875, showing a decrease of 74,538 tons this year. Some 20 miles of steel rails have been contracted for for the Atlantic, Mississippi, and Ohio Bay roads. American iron rails have been quoted at the works at \$22 to \$45 per ton currency. Old iron rails have made \$21 to \$22 per ton currency. Six railway, canal, and mining companies, controlling the production and transportation of anthracite coal, have been

Along time in combination to reduce production and maintain prices. The Lehigh Valley Railroad having recently exceeded its proportionate production, disputes ensued, causing the formal dissolution of the coal combination on Tuesday. A decrease in coal prices is anticipated from future competition, as 500,000 tons will be sold at auction in New York on Tuesday for the Reading Railroad with other companies. The disruption gives general satisfaction.

MINING NOTES FROM NORTH WALES.

During the last few years no marked progress has been made in developing the lead ores of several important districts in North Wales, whilst, on the other hand, several mines that at one time paid excellent dividends when lead was much lower in price than it now is have been closed. The water has been the main source of stoppage in most cases, but there certainly does not appear any substantial reason why it should not be overcome, as it is at very large collieries where it is more overpowering than can be the case in lead mines. What appears to be necessary to the successful working of mines of every description is a sufficiency of capital to provide the best machinery and appliances capable of contending with and overcoming every possible contingency that can arise. Where that has been done success has, as a rule, been the result, but many places capable of paying handsomely have been standing for a long time, entirely owing to the want of sufficient money to drain them; this is more particularly the case in the Mold district, once the most important in North Wales so far as regards the production of lead ore, so that there are many really fine concerns water-logged that would be better to open out than to break into new and unproven ground. Some of the mines continue to do very well, but considering the number of mines the output is certainly by no means so large as one would expect. In Montgomeryshire the Van maintains its position as the best and most profitable lead mine in the northern part of the Principality, and is likely to maintain it. The Minera has been doing well, but not equal to what it did a few years ago. The calcareous hills of Denbighshire are traversed by faults, and full of lodes rich in ore, the great Minera vein, in fact, coinciding with a fault which traverses the Denbighshire coal field from the south-east to the north-west. Between those two points there is little doubt but there are valuable deposits of ore yet to be worked.

In Flintshire there is room for very great improvement, and that this could be easily effected we heard on all sides during a visit made a few days since. All that is required, as before stated, is capital to drain several mines, when good returns would be quickly obtained. To some extent it is said this is about to be done, the Diamond and Boring Company, it is said, having contracted for tunnelling and driving levels in two or three mines for the purpose of drawing off the water. This is to be done by a company who, paying for the work, will be entitled to a certain royalty on the ore raised. Ransome was at one time a paying mine, and there was drawn from it in 1868 no less than 420 tons of ore, which contained 3370 ozs. of silver, and it is understood that it is to be drained and opened out in connection with the adjoining mine. North Hendra appears to have been doing very well, but is evidently capable of still further development, so some new winding machinery is about to be put down. The Great Fren Fownog has passed into the hands of a fresh company, so that with the capital everything looks favourable, and under Captain Wasley's management there is scarcely a doubt but what the mine will well repay those who have invested in it. From Hall United is another of the mines that is showing symptoms of vitality and strength, and an extensive addition is about to be made to the plant in the shape of a 60-inch Cornish engine with boiler, and a pair of winding engines, with capstan and head gearing. This looks as if business on an extensive scale is intended, and the prospects are certainly in every way encouraging; Mr. Edwards the treasurer of the county, is the secretary, and Mr. Cottingham the engineer. Under the able and energetic management of Capt. Prior the Denbighshire Consolidated Mine is looking most healthy, and the patience of the shareholders will doubtless before long be rewarded by a dividend. The men have been driving out to the east and west. The lodes improve. Everything appears to favour the view that the Denbighshire will be one of the finest mining properties in the district, and will well repay the shareholders.

A short distance from Mold is the old Cathole Mines, but more recently known as the Mold Mines. The place has undergone some vicissitudes, and at one time looked as if it was about to be made into a good property, of which, during a visit some time since we paid to it, it appeared to have all the elements. It has been standing for some time, but it is understood that it will be opened out before long under favourable auspices. At Bryn Hall, which is under the management of Capt. Cottingham, everything is going on most favourably, and some very good discoveries have recently been made that cannot fail to greatly increase the confidence of the company in the value of the mine. The Pant-y-Mwyn Mine has improved very much, and a fine discovery of lead has been made. Gen. Alyn is stopped, although the mine is not only good but the ore formerly worked was of a very rich character. Like many more, however, in the same district, it can be made to pay well. The mine managers in the district, with sufficiency of capital to put down the necessary pumping and other machinery. There was a rumour, however, a few days ago that it was likely to be taken by a company. There are some two or three other mines in the Flintshire field that are looking better than they did, still the output is not so large as it might be by a long way, for the quantity in 1874 was actually less than it was in 1868, whilst the price at the Holywell sales was 5/ per ton higher in the former year than in the latter. Consequently, with the present price of lead and ore, mines that paid a few years ago should now make much heavier returns. It should also not be overlooked that whilst our consumption of lead is increasing our imports for the first half of the present year have declined. There is, therefore, every reason to believe that not only will the present value of lead be maintained, but that prices will advance.

Collieries are in much greater favour with capitalists than lead mines, and there does not appear to be any great difficulty in forming a company to take to any really legitimate concern, although the profits of late have been remarkably small, whilst there is constant trouble with the workmen. The North Wales coal field may be said to be confined to the counties of Flint, for the entire field of the two or three little pits in Anglesea does not reach 100 tons a week. The Flintshire field, as at present worked, is a small one, but there is no question but what there are valuable beds below the New Red Sandstone in the direction of the dip of the strata, and going on to Cheshire. Indeed, geologists say that the coal formation of Flintshire continues on to Lancashire and Cheshire. At Queensferry, Buckley, in the Mold district, and along the estuary of the Dee, there are some very extensive collieries, the seams being at a moderate depth from the surface, and some of them of excellent quality. At Leeswood, near Mold, there is about the best canal to be found in any part of the kingdom. According to the assay of Dr. A. Fyfe the early canal yields a larger quantity of gas than the Wigan canal. The proprietors are—Wigan canal, 12,010 cubic feet per ton; Leeswood early canal, 14,280 ft. per ton.

About the most important venture made in North Wales was the sinking of a shaft close to the Dee, at Biggill, where shifting sand and water had to be encountered, so that the men had to work short shifts in diving-bell dresses. Mr. Woodhouse, however, succeeded, and a 20-ft. shaft was sunk to the coal, and the Battersfield Colliery is now about the most important in the county. A very fair business is being done here, having for the first time obtained a contract from the London and North-Western Railway Company for a supply of locomotive coal. One of Barrow's and Flint's patent tipplers are being put down, so that there are all the necessary adjuncts for doing the working of collieries at the present time when prices

are so very low, and the competition consequently far keener than can be remembered by the oldest owners.

Near to the county town, Flint, there is one colliery, about the only one the district can boast of, consequently there is a very fair market at home for a good deal of the produce. The business doing at it has improved of late, the company being in a position to supply the lead and chemical works in the neighbourhood, some of the latter in particular (such as Ma-pat's) being on a very extensive scale, and consuming very large quantities of coal. There are very few collieries in the neighbourhood of Holywell so well known for its gushing well, with its assumed healing properties, as well as for its lead mines. The one, however, that has been at work for some time—the Englefield Colliery—has come to grief, and is now being wound-up by liquidation, and Mr. Jones, the original proprietor, has again taken it into his own hands, and it is quite probable that he will make it pay.

Queensferry, six miles or so from Chester, is a small shipping place for coal from the pits in the immediate neighbourhood of which there are several, as well as from the Aston Hall, near Hawarden, and of which Mr. Gladstone, the late Premier, is the lessor. There is also a line from the latter to the London and North-Western Railway at Queensferry. At the latter the Eleanor Colliery is doing much better than it did some time since before it changed hands; it is now the property of a large chemical company at Connah's Quay, which, of course, takes its supplies of fuel from its own pits. Mr. F. Thompson has taken the Queensferry Colliery entirely into his own hands, having separated from his brother, and is working the new pits only, doing tolerably well considering the state of trade generally. The Aston Hall Company are rather slack of business so far as regards coal, but are doing very well in bricks. The clay raised in the pits is of excellent quality, producing bricks perfectly white, and for which there is an excellent demand for Liverpool and other places for the facing of buildings, public and private.

In what is known as the Buckley Mountain there are several collieries and large brick and tile works, there being almost unlimited supplies of fire-clay. The Buckley Colliery is doing very well, and is paying very well it is said. The coal is an excellent quality for steam purposes, and considerable quantities are being sent to Holyhead for the use of the steam packets at that place. The Little Mountain, in the same locality, is turning out something like 500 tons of coal a day, but the men are putting in only four or five days a week. The proprietors of the Little Mountain Coal, Iron, and Clay Company are putting down new machinery and opening out a new pit, which will add materially to their producing power. Near to Buckley borings are being made through the New Red Sandstone for the purpose of proving the measures, as it is intended, if all is found right, to open out an extensive coal field of some 1400 or 1500 acres.

The Flintshire coal field, it may be said, extends along the estuary of the Dee to the Point of Aire, a distance of about 15 miles, being in some places very narrow and broken by faults. Mostyn is almost the extreme point where coal is worked, and in all probability is the first place in North Wales where coal was raised. Pennant, in his account of the collieries of Flintshire, states that there is documentary evidence to show that the coal seams of Mostyn were worked in the time of Edward III., and from a work published in 1784, entitled "A Tour in Wales," we are told that coal was sent from Mostyn to Dublin and the eastern parts of Ireland. However, there are several collieries there at the present time, as well as some blast-furnaces, but business is very far from active. The Hammer Colliery, owing to differences between the men and Sir George Elliot the lessee, has been closed for the present. It is expected, however, that Lord Hammer, the lessor, who took possession on the 12th inst., will work it on his own account, and so keep the workmen going.

The West Mostyn Colliery Company, of which C. J. Shakespeare is the chairman, have got down to the 9th coal at a depth of 100 yards. The shaft is 15 feet in diameter, and tubbed about 50 yards. The company are going down still lower to another seam, and have got down a few yards with the second shaft, but have been stopped by the water. A couple of pumps, one of Tanzye Brothers and one of Garforth's is about to be put down, when the work of sinking will be resumed.

The iron trade does not appear to be at all brisk in North Wales, for the Mostyn Coal and Iron Company have blown out their two furnaces, whilst the men belonging to the colliery are working short time.

From the little shipping places at Connah's Quay and Queensferry Spanish ore has recently arrived, a cargo having arrived the day we were there from Santander. It is sent into Staffordshire, and some of it into the Wrexham district. Coal is also been shipped from Queensferry to Barrow for some of the works at that place. Taken altogether, it may be said that the coal trade of North Wales is as good, to say the least, as it is in most other parts of the kingdom.

REPORT FROM CORNWALL.

Aug. 24.—To say that the week, so far as mining generally is concerned, has been an uneventful one is not to be very original, but as things go it is tolerably satisfactory. If matters will not get better, it is at least some consolation to know they are no worse. And that is the most and the best we can at present say.

The enquiry into the causes of the fatal tonite explosion at West Basset has been resumed, and concluded without any definite verdict. Dr. Foster, Her Majesty's Inspector, attended the adjourned inquest, and the investigation was thorough and exhaustive. It was distinctly stated in evidence by the brother of the deceased man, who was working with him at the time of the explosion, that the tonite exploded while it was being forced down with an iron bar, no cup whatever being used, and this the witness stated had been done in reliance on one of the rules for the use of this explosive, which states:—"There is no danger whatever in loading a bore hole or mine so long as the cap and primer are not inserted. The ordinary cartridges may be cut or broken up, and rammed in with a metal or other rammer as tight as possible if the charges and holes do not agree, but the primer with the cap should always be put in easily." The coroner and the jury alike believed this rule to be misleading, and Dr. Foster, while concurring in this view, explained the curious fact that the use of an iron bar on an explosive had not been contemplated by the Act of Parliament. The Act forbade the putting down of the first layer of tamping with an iron bar, but it said nothing about putting in an explosive with such a bar. It might be inferred that the restriction applying to the one applied to the other, but it was not distinctly stated, otherwise the witness who had done so would be liable to prosecution. Although he disapproved of the instructions contained in the poster, he thought that proper instructions should be issued generally amongst the workmen in connection with explosives. Mr. Mackie, who represented the Tonite Company at the inquest, made an exhaustive defence of the qualities of tonite as specified by the company, and remarked that only one accident had previously occurred in connection with it. He attributed the present fatality to the force brought to bear in driving the explosive in. The violent friction to which the first piece had been subjected had caused it to ignite; it continued burning slowly until the second piece was inserted, when it, naturally enough, exploded. The jury were, as we have stated, unable to arrive at any verdict, but it is stated that they considered "regulations" for use had emanated from the company, and so strong was the conviction of their impropriety that, despite a promise on the part of the representative of the company that they should in future be clearer, a verdict of manslaughter was proposed, and received support.

The British Archaeological Association have been holding their annual congress this year in Cornwall, and during the past week have made a pretty extensive acquaintance with the antiquities of the county. Singularly, ancient mining except in sundry allusions to the days of the Phœnician tin trade, has been almost wholly ignored in their proceedings.

A promising member of one of our leading mining and smelting families has been removed at an early age, and almost suddenly, by death—Mr. J. B. Bolitho, son of Mr. T. S. Bolitho, and son-in-law of another great commercial magnate of the West—Mr. John Michael Williams. He contested St. Ives unsuccessfully at the last general election.

They are plucky people who in these days will initiate and persevere with new mining adventures, especially in what in the course of time has become an extinct mining district. And such one to shareholders was the Great Wheel Eleanor, North Bovey, near Moretonhampstead, and on the north-eastern flank of Dartmoor. They have an extensive sett in easy granite ground, with several well-defined lodes. On Monday nearly 50 shareholders visited the mine, for the purpose of inspecting the newly-erected machinery. Considering the mine has only been in existence a little over twelve months, the business like appearance of the whole arrangements was highly creditable to the management. The new engine, working for the first time, was smoothly driving 23 heads of stamps, well supplied with capital tinstone. The resident agent, Capt. John Tredinnick, showed the party over the mine, explaining the various processes, and answering the numerous questions put to him in a manner which was exceedingly satisfactory to the shareholders. One thing greatly to the advantage of the mine is its situation at the foot of a great hill. A little below the mouth of the lowest adit the surface works have been laid out, with plenty of level land for extending the dressing-floors, or erecting of extra machinery. The mine is only two miles, moreover, from the railway station, and is in the midst of a well-mineralised district. The tinstone on the mine is of very good quality. The company have had much uphill work to contend with, and are now pluckily fighting against the depression in mining generally. Their success would revive mining in one of the oldest centres.

Arrangements for re-working the Perran Iron Mines are now in active progress, and it is hoped that ere long they will be in active and permanent work. Mr. Rebeck is now engaged in completing the necessary financial details. The quantity of ore is enormous, and Mr. Bessemer has testified to its quality. The promoters state that they can sell the ore at 11s. 6d. a ton, realising a profit of 3s. per ton. The costs of this ton are said to be—royalty, per ton, 6d.; average cost of getting, 3s.; general charges, 1s. 6d.; and carriage to port, 3s. 6d.: total cost, 8s. 6d.

TRADE OF THE TYNE AND WEAR.

Aug. 23.—There is no general improvement in the Coal and Iron Trades. The shipments of steam coal continue on a good scale, and most of the works in Northumberland are fully employed. In Durham some of the gas coal works are also pretty well employed, but the demand for house coal is very moderate and infirm, and manufactory coals are in no better demand, while prices still have a downward tendency, although it is hardly possible that they can be further reduced. In the Durham miners' arbitration case some progress has been made. The accountants appointed by the arbitrators have ascertained that the average price of coals in Durham at the present time is 10d. per ton below the selling price at the time the last arbitration was settled, when an award was made of 7 per cent. on the wages. At the Wood Memorial Hall, on Saturday, the coalowners of Northumberland, presided over by Mr. H. Taylor, received a deputation from the Miners' Association on the subject of the alternative submitted to them by the owners on the previous Saturday—namely, to consent to the introduction of the Welsh system of paying for round coal, or to accept a reduction of 20 per cent. Mr. Burt, M.P., who headed the deputation, announced the decision of the Association arrived at to consent to the proposed reduction being referred to arbitration. The coalmasters agreed to the proposal, and chose Mr. G. B. Foster and Mr. J. B. Simpson to act for them.

On Tuesday at Middlesbrough there was an average gathering of gentlemen connected with the iron and coal trades. The tone of the market was quiet, and there was little inclination to do business, though a few enquiries were reported for pig-iron for the autumn and winter months. Though the financial difficulties of the district are to some extent smoothed over, it is feared they are not entirely gone, and adverse rumours have been again current within the last few days. Meetings have been held in the case of Messrs. T. Vaughan and Co. and another firm, and it is anticipated that satisfactory arrangements will be made. There is likely to be some improvement in the iron rail trade if the Welsh makers do not succeed in running Cleveland out of the market in respect of price. Work has been taken at a lower figure to the extent of even 1s. per ton in South Wales. A few good orders placed in the North of England at the present time when everything is so low would put a new face on things, for many rail manufacturers being so long without work have almost lost hope. The price ranging about 6/ is barely remunerative, generally speaking, for heavy rails. Plates and bars remain pretty much in the same condition. There is very little demand. The quotations for pig iron are—No. 1, 48s.; No. 2, 46s. 6d.; No. 3, 44s. 6d.; No. 4, 42s. Messrs. Ruxton, Dixon, and Co. have had a meeting with their creditors, who have accepted 3s. in the pound. The market closed flatter than it commenced, owing to the bills of one or two firms in the district having been lately returned.

The Consett Iron Company report to be submitted to the meeting on Saturday shows a profit for the year of 86,257 2s. 3d. The directors recommend that this be applied as follows:—In meeting the interim dividend of 7s. 6d. per share paid on Feb. 15, 20,700; in extinguishing the special expenditure on blast-furnaces reconstruction, new brickworks, and Westwood S. 100s. 7d.; in paying dividend of 15s. per share 41,400; in carrying forward an undivided profit of 6374 6s. 8d.; making a total undivided profit of 24,542 1s. 9d. The result of the past year's operations must be considered satisfactory, having regard to the condition of the iron and coal trades. The general manager is directing his attention to the influence of steel rail making on the iron rail trade, and whilst it is yet premature to come to any conclusion on the subject, the directors have every reason to believe that the position and resources of Consett will enable it to maintain its advantages under any altered system of manufacture that experience may render useful. The further opening out of the Langley coal field is tending to diminish the apprehensions that were at first created as to the quality of the main seam. It now appears likely to prove of excellent working quality. Before the end of 1876 the works will be completed as to allow of a considerable quantity of coke being available for sale. The directors completed the purchase from Mr. Carr of the Milkwell Burn coal field, near Ewecaster, held by him under the Duke of Northumberland, Mr. Laycock, and others, as foreclosed in the report presented a year ago. The directors think it better, having regard to the present state of the trade, to postpone for a time any expenditure in working out his tract. The cessation of the war in Spain has enabled the Oregon Iron Company to commence the delivery of ore under its contract with the company. Supplies are now being regularly received.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

Aug. 24.—Lead mining in Derbyshire has not undergone any material change of late, and the production of ore appears for a long time not to have increased. Limited companies have not taken root in the lead districts, as they have done in many others, whilst a good many mines that have been opened out by persons with limited capital have been speedily abandoned and left standing. Some alterations, no doubt, would take place were there railway accommodation to open out districts where lead is being worked even at the present time. A proposal to that effect has been made on one or two occasions, but it appears a line connecting any two towns of importance or reaching a main system, would be most costly, owing to the nature of the country that would have to be passed through. Still, there are other things that might be expected besides lead, for there is plenty of limestone, so that bringing together the lead and coal districts of Derbyshire one would think could not fail to be advantageous to both. The demand for house coal has not materially altered, and is still very quiet for the season, whilst prices are very low.

The proposed winding-up of the Industrial Coal and Iron Company by liquidation shows that the affair is in anything but a healthy state. The company first purchased a colliery near Chesterfield, and then commenced sinking to the Silkestone coal near to Handsworth Woodhouse, a few miles from Sheffield, the expenses attending which have been very heavy. The concern, according to one of the directors, has been going down for some time, and it is somewhat singular that the promoter, the Chairman at the last meeting, and most of the directors, belonged to the unfortunate Silkestone Fall Company, and had the qualifying shares given to them by the vendors.

The Iron Trade is steady, some of the foundries being fairly off for orders, whilst the make of pig is about the same as it has been.

If Sheffield business is still in a depressed state in several branches, and in but comparatively few are the men fully employed on trade which can be called brisk. The works employed in rolling heavy armour plates continue to turn out large quantities of them, both for the home and foreign Governments, but there is only a moderate output of ordinary boiler plates and sheets. Not much is being done in ordinary rails, whilst the Bessemer mills are kept well going. Makers of malleable iron castings are amongst the few who have been doing anything well. But malleable iron can now be cast, not

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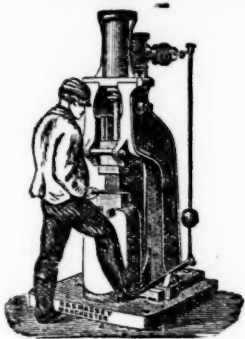
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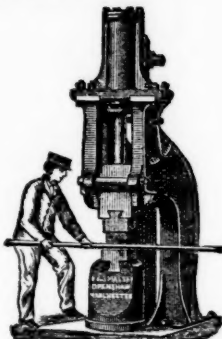
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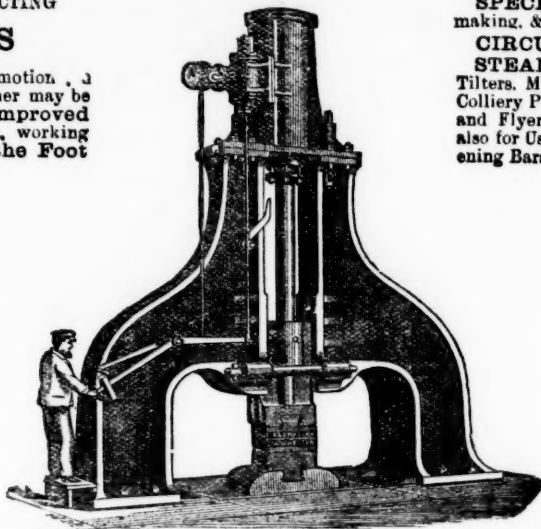
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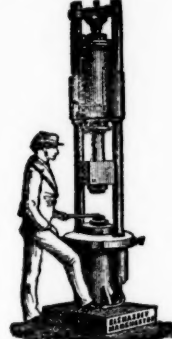
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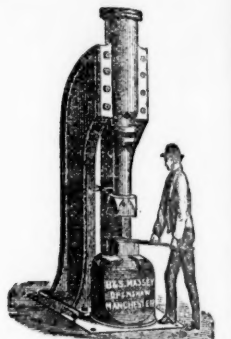
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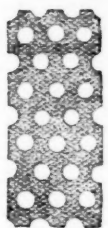
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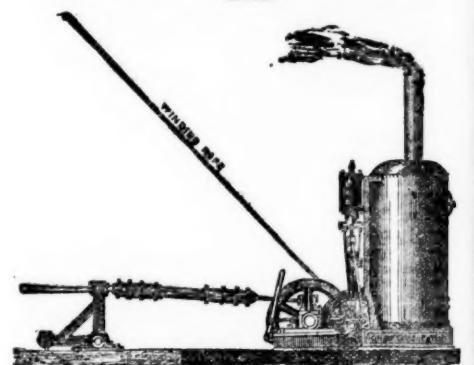
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40000	Santa Barbara, c, t, i, Brazil	0 10 0	—	—	—
120000	Scottish Australian Mining Co., c, t, i	1 00	—	—	—
50000	Scottish Australian Mining Co., c, t, i	0 5 0	—	—	—
5000	Sierra Butte, c, t, i, California	2 00	1 1/2	1 1/2	—
60000	South America, c, t, i, Nevada	5 00	—	—	—
2535000	St. John del Rey (45 stock and multiples dealt in)	335 345	—	—	—
15000	Sweetland Creek, c, t, i, California	4 00	—	—	—
20000	Tecoma, c, t, i, So. America	5 00	3 1/2	3 1/2	—
15000	Western Andes, c, t, i, New Granada	5 00	—	—	—

NON-DIVIDEND FOREIGN MINES.

Shares.	Mines.	Paid.	Last Div.	Clos. Fr.	Last Call.
20000	Anglo-Australian, c, t, i, Victoria	5 10 0	—	—	—
50000	Anglo-Australian, c, t, i, Victoria	10 00	—	—	—
12000	Argentine, c, t, i, Argentina Republic	10 00	—	—	—
10000	Australian Central, c, t, i, (also 6000 deferred shares)	1 00	—	—	—
30000	Bellevista, c, t, i, Peru (40 shares)	10 00	—	—	—
30000	Blue Tent, c, t, i, California	5 00	—	—	—
50000	Braganza, c, t, i, Brazil	0 15 0	—	—	—
12000	Camp Floyd, c, t, i, Utah	10 00	—	—	—
25000	Cesena Sulphur Company, Romanga, Italy	10 00	—	—	—
60152	Chontales, c, t, i, Nicaragua	2 00	—	—	—
8000	Clifton, c, t, i, Colorado	5 00	—	—	—
15000	Condes de Chili, c, t, i	5 00	—	—	—
5000	Excelsior Hydraulic Gold Washing Co., California	5 00	—	—	—
100000	Exchequer, c, t, i, California	1 00	—	—	—
40000	Holcombe Valley, c, t, i, California	1 00	—	—	—
6000	Hornachos, c, t, i, (40 shares) Spain	10 00	—	—	—
90000	Imperial Brazilian Collieries, Brazil	5 00	—	—	—
90000	I. L. & Co., c, t, i, California	1 00	—	—	—
5000	Javali, c, t, i, Nicaragua	2 00	—	—	—
12000	Llanidloes, c, t, i, Viscaya, Spain (29 shares)	1 15 0	—	—	—
75000	Malabar, c, t, i, (1000 issued)	1 00	—	—	—
5000	Malpaso, c, t, i, Colombia (10000 pref. shares, fully paid)	1 00	—	—	—
14000	Menzelberg, c, t, i, Honnet, Germany	5 00	—	—	—
6000	Monte Loretto, c, t, i, Italy	5 00	—	—	—
50000	New Quebrada, c, t, i, Venezuela	5 00	—	—	—
20000	New Rosario, c, t, i, Mexico	1 00	—	—	—
20000	New Zealand Kapanza, c, t, i, Coromandel	5 00	—	—	—
3000	Oregon, c, t, i, Oregon, U.S. (preference shares)	4 00	—	—	—
5000	Panama, c, t, i, (25000 debentures)	4 00	—	—	—
5000	Pestana, c, t, i, Italy	4 00	—	—	—
5000	Rica, c, t, i, Colombia (4000 issued)	3 00	—	—	—
22,151,000	Rio Tinto, c, t, i, Huelva, Spain	1 00	—	—	—
10000	Rosa Grande, c, t, i, Brazil (41 shares)	10 00	—	—	—
5000	Russia Copper, Oregon and Ufa	10 00	—	—	—
25000	San Pedro, c, t, i, Chili	2 00	—	—	—
10000	Silver Flume, c, t, i, Colorado	1 00	—	—	—
87500	Speedrift, c, t, i, Colorado	2 00	—	—	—
5000	Tecoma, c, t, i, Utah	10 00	—	—	—
20000	Thornhill Reef, c, t, i, Australia	10 00	—	—	—
43174	United Mexican, c, t, i, Mexico	25 15 8	—	—	—
14000	Utah, c, t, i, Utah	5 00	—	—	—
24000	Victoria (London), c, t, i, Australia (25,000 sh. 18s. pd.)	1 00	—	—	—
75000	Yorke Peninsula, c, t, i, South Australia	1 00	—	—	—
40000	Yorke Peninsula, c, t, i, South Australia	1 00	—	—	—

FOREIGN AND MISCELLANEOUS STOCKS, BONDS, LOANS, AND TRUSTS.

Shares.	Mines.	Paid.	Last Div.	Clos. Fr.	Last Call.
10000	Argentine, 1868, 6 per cent.	34 38	—	—	—
10000	Brazilian, 1868, 6 per cent.	17 19	—	—	—
10000	Chilian, 1868, 7 per cent.	93 95	—	—	—
10000	City of Providence, 6 p.c. coupon bonds	95 97	—	—	—
10000	Egyptian, 1862, 7 per cent.	45 47	—	—	—
10000	Do., 1868, 7 per cent.	45 47	—	—	—
10000	Do., 7 per cent., V.M.L.	47 51	—	—	—
10000	Do., 9 per cent., V.M.L.	47 51	—	—	—
10000	Do., 7 per cent., K.M.L.	44 45	—	—	—
10000	Foreign and Col. Gov. Trust, 5 p. cent.	77 82	—	—	—
10000	Do., 5 per cent., 2d issue	51 59	—	—	—
10000	Do., 1872, 4th issue	60 66	—	—	—
10000	Do., 1872, 5th issue	64 70	—	—	—
10000	Peruvian, 1870, 6 per cent.	15 15	—	—	—
10000	Do., 1872, 5th issue	12 12 1/2	—	—	—
10000	Russian, 5 1/2 per cent. L. Mort.	78 82	—	—	—
10000	Spanish, Quicksilver Mort., 5 p. cent.	90 92	—	—	—
10000	United States Mort., 5 p. cent.	96 97	—	—	—

NON-DIVIDEND MINES.

Shares.	Mines.	Paid.	Last Div.	Clos.	Fr.
40000	Aberdunant, c, t, Llanidloes*	1 0 0.	1 1/2.	1 1/2	1 1/2
10000	Aberystwith, * s, t, Cardigan	5 0 0.	—	—	—
7800	Alvick & Burg, * s, t, St. Aust. (23 sh.)	1 10 0.	2 1/2.	2 1/2	2 1/2
18000	Ambrase Lake, t, c, Liskeard	1 18 6.	—	—	—
12000	Assheton, t, Carnarvonshire*	5 0 0.	1 1/2.	1 1/2	—
50000	Ballycummick, * c, Schull	2 0 0.	—	—	—
12000	Bedford United, c, Tavistock	1 17 6.	1	3/4	1
28000	Belstone, * c, Devon (27,000 fully pd.)	1 0 0.	3	2 1/2	3
15000	Elan United, * s, t, Cardigan	1 0 0.	1 1/2.	1 1/2	1 1/2
15000	Hine Hills, t, c, St. Agnes	2 11 6.	—	—	—
30000	Bodidris, t, c, Denbighshire	1 0 0.	1	—	1
30000	Bowen Hill, t, c, Denbighshire	1 0 0.	—	—	—
6000	Bradwell Moss Rake	1 0 0.	1 1/2.	1 1/2	1 1/2
20000	Brynambor, t, Cardigan	1 0 0.	—	—	—
4000	Broadway, s, t, Cardigan*	4 0 0.	—	—	—
4127	Bwlch Consols, s, t, Cardigan*	5 0 0.	—	—	—
30000	Caldbeck Fells, t, Cumberland*	2 0 0.	—	—	—
5584	Cann Camborne, t, c, Camborne	5 2 6.	3 1/2.	3 1/2	3 1/2
10000	Cathedral, t, c, Gwynnapan*	1 10 0.	1 1/2.	1 1/2	1 1/2
40000	Central Foxdale, t, Isle of Man* (22 sh.)	1 0 0.	—	—	—
10000	Central Van, t, c, t, Llanidloes	5 0 0.	—	—	—
30000	Cwm Dwyfor, t, c, t, Carnarvonshire...	1 0 0.	1 1/2.	1 1 1/2	—
3000	Cwm Nant Llyn, t, t, Montgomery	1 0 0.	—	—	—
3000	Cwmystwith (New) [Nt. shares]	4 0 0.	—	—	—
10000	Denbighshire Consolidated, t*	5 8 0.	3	2 1/2	3
10000	Dunoy Dong, t, c, St. Just	5 0 0.	3	2 1/2	3
10000	Dunoy Dong, t, c, St. Just	5 0 0.	3	2 1/2	3
10000	Duch Green Consols, c, Caistock	5 0 0.	3	2 1/2	3
512	East Basset, c, Redruth†	77 7 6.	15	10 1/2	—
5000	East Basset, c, Redruth†	77 7 6.	15	10 1/2	—
5000	East Chiverton, t, Penzance	6 12 0.	2 1/2.	2 1/2	2 1/2
6000	East Goginan, t, Cardigan	2 0 0.	2	—	2
5000	East Grenville, c, Camborne	7 8 6.	—	—	—
30000	E. Nant-y-mwyn, * t, Brecknockshire,	1 0 0.	3 1/2.	3 1/2	3 1/2
6000	East Tywarhwal, c, St. Agnes	0 10 0.	4 1/2.	4 1/2	4 1/2
15000	East Van, t, Llanidloes	5 0 0.	8 1/2.	9 1/2	10
5000	Elgar, * s, t, Cardiganshire	1 0 0.	1 1/2.	1 1/2	—
8000	Fronvellan, t, Mont.* (4000 sh. fy. pd.)	1 0 0.	—	—	—
5000	Gawton, c, Tavistock	4 1 6.	5 1/2.	5 1/2	5 1/2
12000	Glan Clwyd, t, Gwyddelwern,	1 0 0.	2 1/2.	2 1/2	2 1/2
10000	Glan Severn, s, t, Flintshire	1 0 0.	—	—	—
2000	Glenroy, * s, t, Isle of Man	4 0 0.	5 1/2.	5 1/2	5 1/2
5000	Glyn, * t, Llanidloes	2 0 0.	2 1/2.	2 1/2	2 1/2
15000	Gobbett, t, Dartmoor	1 0 0.	—	—	—
10000	Goginan, and Level Newydd, Card.†	2 10 0.	—	—	—
10000	Gold, c, Montgomeryshire	1 0 0.	—	—	—
2000	Gold, c, Montgomeryshire	1 0 0.	—	—	—
5000	Gorsedd and Merilyn Cons., Flint	2 10 0.	2 1/2.	2 1/2	2 1/2
9000	Great East Foxdale, t, I. of Man (14 sh.)	0 15 0.	—	—	—
25000	Gwent Pant-y-Pydwel, t, Holywell	2 0 0.	—	—	—
6000	Great Wheal Eleanor, t, North Bovey.	1 0 0.	3	2 1/2	—
8000	Grosvenor, t, Holywell (21 sh.)	0 7 0.	—	—	—
10000	Harehow Gill, * t, Durham (21 sh.)	0 5 0.	1	3/4	1
64	Harwood, * t, Durham	0 15 0.	1	3/4	1
4000	Keswick United, t, c	5 0 0.	—	—	—
4000	Kilfrith, t, Chacewater	1 8 0.	3 1/2.	3 1/2	3 1/2
5000	Kingston Consols, s, t, Cornwall	1 0 0.	1 1/2.	1 1/2	—
12000	Ladywell, * t, Salop	2 10 0.	1 1/2.	1 1/2	1 1/2
2500	Levant, c, t, St. Just	9 6 6.	—	—	—
64	Llanidlo, s, t, Flintshire	50 0 0.	—	—	—
15000	Llanlivery Cons., t, c, s, Llanlivery.	1 0 0.	1 1/2.	1 1/2	—
25000	Llanrhall-yr, t, Montgomery*	2 0 0.	—	—	—
15000	Llanrwst, t, Carnarvon	2 0 0.	2 1/2.	2 1/2	3
15000	Llwyn Teify, * s, t, Cardigan	1 0 0.	—	—	—
6000	Medlyn Moor, t, Wendron	1 4 10.	1 1/2.	1 1/2	1 1/2
10000	Mellauar Copper, Hayle*	2 0 0.	—	—	—
10000	Monydd Gerdun, t, Cardigan*	5 0 0.	4	3 1/2	4
4000	Nanty, t, Montgomeryshire*	1 0 0.	—	—	—
5000	Nant-y-Ronen, s, t, Cardigan*	1 0 0.	—	—	—
12000	Neptune, * c, Penrannoth	0 5 0.	—	—	—
3000	New Consols, t, North Wales	1 0 0.	—	—	—
3000	New Chiverton, t, Penrannoth	6 0 0.	1 1/2.	1 1/2	1 1/2
3000	New Consols, c, Tavistock*	2 0 0.	—	—	—
8000	New Crickheath, * t, Shropshire	2 0 0.	—	—	—
8000	New Dolcoath, t, c, Camborne*	3 0 0.	1 1/2.	1 1/2	1 1/2
2000	New East Foxdale, s, t, Isle of Man	0 15 0.	—	—	—
18000	New Fowey Consols, t, St. Blazey*	3 0 0.	2	1 1/2	2
2 00	New Hendra, t, Breage	2 9 0.	1	3/4	1
10000	New North Pool, * c, Illogan	3 0 0.	1 1/2.	1 1/2	1 1/2
4000	New Pembroke, t, c, Par Station	5 8 0.	3 1/2.	3 1/2	3 1/2
5000	New Rosewarne, c, Gwinear	5 17 0.	3 1/2.	3 1/2	3 1/2
5000	New St. Agnes, * t, St. Agnes	5 0 0.	3 1/2.	3 1/2	3 1/2
5000	New South Merilyn, t, Flint	2 10 0.	—	—	—
4 00	New South Merilyn, t, Flint	2 10 0.	—	—	—
10000	North Laxey, t, Isle of Man	2 0 0.	3 1/2.	3 1/2	3 1/2
2000	North Prince Patrick, t, Holywell	1 0 0.	1 1/2.	1 1/2	—
2000	North Wheal Towan, t, c, Illogan	1 19 6.	—	—	—
1000	North Rosewarne, c, Gwinear	12 6 6.	—	—	—
4000	North Trelegh Wood, t, Redruth*	1 0 0.	1 1/2.	1 1/2	—
5938	North Treskerby, c, St. Agnes	3 15 4.	—	—	—
6000	Old Talargoch, t, Flintshire*	2 0 0.	—	—	—
2800	Old Tincroft, c, t, Lelant*	4 0 0.	4	3 1/2	4
4923	Parya Mountain, * c, Anglesea	3 0 0.	3 1/2.	3 1/2	3 1/2
6000	Pateley Bridge, t, Yorkshire	5 0 0.	2 1/2.	2 1/2	2 1/2
6820	Pedn-ar-drea, t, Redruth†	9 17 0.	—	—	—
6000	Pennant, t, bar, North Wales*	5 0 0.	5 1/2.	5 1/2	5 1/2
12000	Penneryll, t, Shropshire*	2 0 0.	1 1/2.	1 1/2	1 1/2
12000	Plympton, t, Llanidloes*	2 6 0.	3 1/2.	3 1/2	3 1/2
648	Polrone, t, Breage	21 0 0.	—	—	—
6000	Port Nige, s, t, Carnarvonshire	2 0 0.	2	1 1/2	2
512	South Dolcoath, t, c, Redruth†	12 10 0.	1 1/2.	1 1/2	1 1/2
12000	South Llanur, t, Cardigan*	0 12 6.	—	—	—
18000	South Roman Gravel, t*	1 0 0.	1 1/2.	1 1/2	1 1/2
2000	South Roskear, t, c, Camborne	6 10 0.	6	4 1/2	—
2000	South Tolcarne, t, c, Camborne	1 9 0.	3 1/2.	3 1/2	3 1/2
12000	South Van, t, t, Montgomeryshire	1 0 0.	—	—	—
937	South Wheal Crofty, c, Illogan	36 10 10.	14	12 1/2	14
4500	South Wh. Frances, c, Illogan†	6 8 4.	1 1/2.	1 1/2	1 1/2
4400	Spear Moor, t, Penzance†	46 17 9.	—	—	—
10000	St. Blazey T.* (22 10s. shares)	2 0 0.	—	—	—
2000	St. Lawrence, Amal, t, Flintshire*	2 0 0.	—	—	—
2000	St. Harmon, * t, Montgomery	3 0 0.	3 1/2.	3 1/2	3 1/2
10 00	St. Harmon, t, t, Flint, Holywell†	1 0 0.	1 1/2.	1 1/2	1 1/2
6000	Suncoast, s, t, Derby. (12,000 called.)	1 0 0.	—	—	—
16300	Sunnyside, * t, Durham	2 0 0.	—	—	—
2000	Talyhoth, * s, t, Talyhoth	1 0 0.	1 1/2.	1 1/2	1 1/2
4000	Teasdale, t, c, Durham	0 18 0.	1 1/2.	1 1/2	1 1/2
10000	Teign Valley, t, bar, Bridgford	1 0 0.	—	—	—
2000	Temple, t, Cardigan*	1 0 0.	2 1/2.	2 1/2	2 1/2
2000	Trebleigh Consols, s, t, St. Ive	0 4 0.	3 1/2.	3 1/2	3 1/2
5000	Trelegh Wood, t, Redruth	8 11 0.	—	—	—
547	Trelyon Consols, t, Redruth	15 0 0.	3 1/2.	3 1/2	3 1/2
12000	Trethellan, s, t, Crantock*	2 0 0.	—	—	—
4000	Trumpet Consols, t, Helston†	9 0 0.	—	—	—
5174	Unity Wood, t, c, Kenwyn	3 18 0.	1 1/2.	1 1/2	1 1/2
10000	Van Consols, t, Llanidloes*	2 10 0.	1 1/2.	1 1/2	1 1/2
1000	Vaughan, s, t, Cardigan	10 0 0.	—	—	—
2000	West Assheton, t, Carnarvon	1 0 0.	1 1/2.	1 1/2	1 1/2
6000	West Basset, c, Illogan†	5 8 6.	4 1/2.	4 1/2	4 1/2
2000	West Bryn Celyn, t, Flintshire	1 0 0.	—	—	—
2500	West Combarnant, s, t, Cornwall	2 0 0.	3	2 1/2	2 1/2
3000	West Combarnant, s, t, Penzance Bridge*	0 11 0.	—	—	—
2000	West Engair Llyn, t, Cardigan	2 0 0.	1 1/2.	1 1/2	1 1/2
5000	West Godolphin, t, c, Breage	1 18 0.	1 1/2.	1 1/2	1 1/2
2000	West Goginan, * t, Cardiganshire	2 0 0.	2	1 1/2	2
5000	West Great Work, t, Breage*	1 0 0.	3 1/2.	3 1/2	3 1/2
2000	West Liangynog, s, t, Montgomery	2 0 0.	—	—	—
2000	West Maria & Fortescue, t, c, Lamer.	4 14 0.	3 1/2.	3 1/2	3 1/2
3000	West Mary Ann, t, Menheniot	0 3 6.	3 1/2.	3 1/2	3 1/2
5000	West Milver, s, t, Flint	1 0 0.	—	—	—
5000	West Penryn, s, t, Cornwall	5 0 0.	—	—	—
4000	West Pateley Bridge, t, Yorkshire	5 0 0.	5 1/2.	5 1/2	5 1/2
2000	West Phoenix, t, Llanidloes	0 18 0.	—	—	—
1403	West Polbreon, t, St. Agnes	3 5 0.	—	—	—
10000	West Roskear, t, s, t, c, Camborne...	0 12 0.	3	2 1/2	3
2000	West Tankerville, t, Salop*	3 0 0.	1 1/2.	1 1/2	1 1/2
5000	West Wheal Gwilt, t, c	4 0 0.	—	—	—
5000	West Wheal Peewer, t, Redruth	0 10 0.	3 1/2.	3 1/2	3 1/2
8000	West Wheal Seton, c, Camborne†	40 0 0.	40	35 40	—
6000	Wheal Agar, c, t, Sannoc	1 0 0.	2 1/2.	2 1/2	2 1/2
6000	Wheal Agar, c, t, Sannoc	1 0 0.	2 1/2.	2 1/2	2 1/2
741	Wheal Basset and Grylla, t	9 18 6.	—	—	—
15000	Wheal Coates, t, St. Agnes	2 0 0.	—	—	—
6000	Wheal Crebor, c, Tavistock	4 1 0.	3 1/2.	2 1/2	3
8400	Wheal Emma, t, c, Buckfastleigh	1 10 0.	—	—	—
5175	Wheal Grenville, c, Camborne*	1 18 6.	1	3 1/2	3 1/2
2000	Wh. Mary Hutchings, * t, Plympton	1 14 0.	—	—	—
8000	Wheal Peewer, t, Redruth	6 5 0.	2 1/2.	2 1/2	2 1/2